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LUME 27 | JULY 25, 1938 | NUMBER 15

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(PATENT APPLIED FOR)

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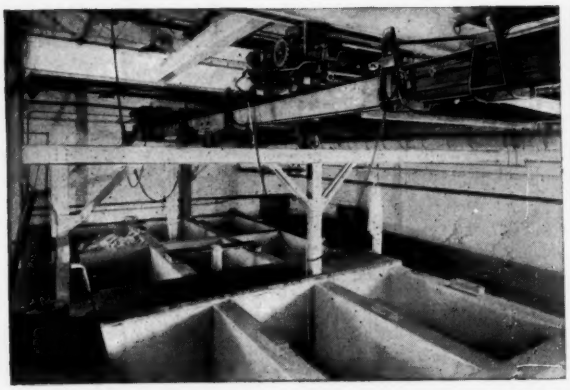

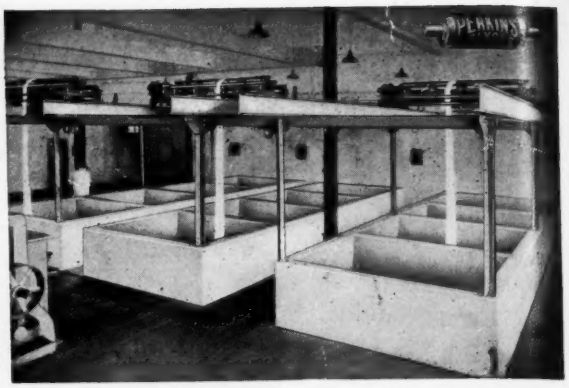

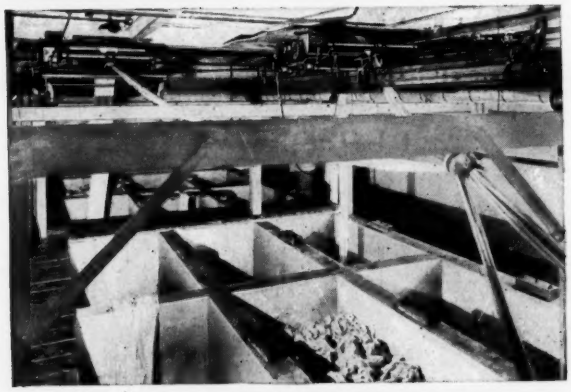

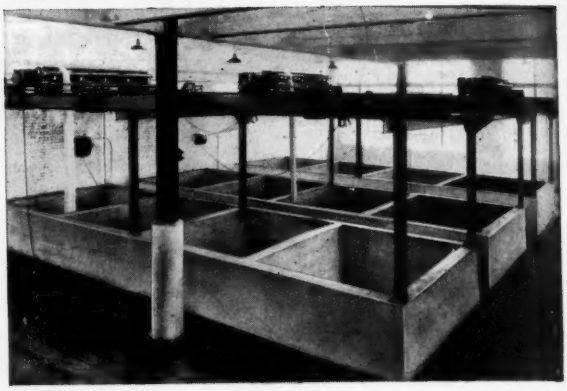

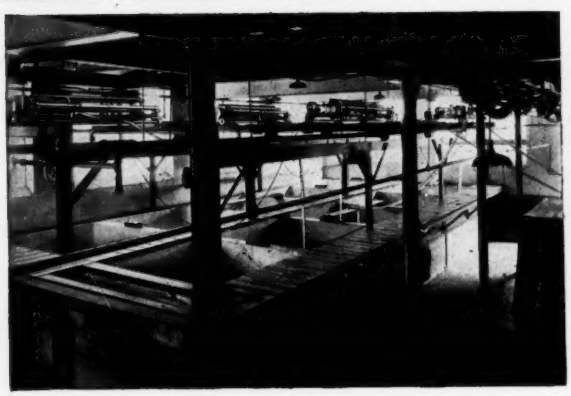

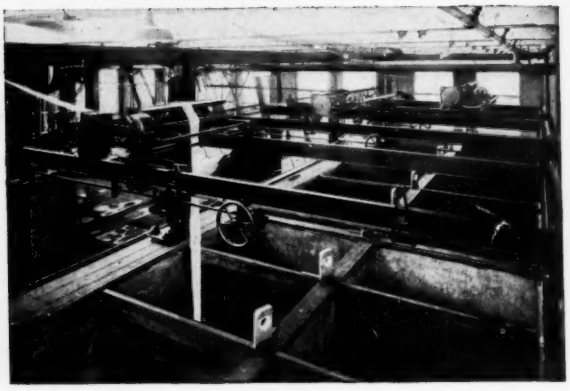

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THE OBJECTS OF THIS ASSOCIATION ARE:

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"To encourage in any practicable way research work on chemical processes and materials of importance to the Textile Industry.

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VOLUME 27 JULY 25, 1938 NUMBER 15

Review and Criticism of the Methods of

Test for Waterproofing

or Water-Repelling Impregnations*

DR. THEODORE STENZINGER

THE first methods for testing the waterproofness or water-repellency of fabrics were naturally evolved at the same time as the development of the first processes for waterproofing or water-repelling impregnations. It is interesting to note that this problem was given serious consideration even as long as 100 years ago. In the technical literature of that period there was included a book by Karl C. Schmieder—"The Waterproofing of Fabrics and some other Materials"—which appeared to be the first comprehensive treatise on this subject.

Schmieder described the development of suitable methods for impregnating fabrics with a combination of aluminum salts and soap. These processes have continued with numerous variations up to recent times and are still utilized to some extent. At the same time, Schmieder developed three methods for testing the waterproofness of the treated fabrics as follows: (1) immersion of the dry sample of known weight in water for 24 hours; (2) subjection of the dry weighed sample to the impact of rain for one hour; and (3) keeping the dry sample of known weight in a moist atmosphere over night. In each case the increase in weight was determined.

Schmieder ultimately devised the so-called trough test in which the fabric was folded in the form of a trough capable of holding a definite amount of water. The penetration by the water into or through the cloth was observed over varying periods of time. This test was used in preference to all others for many years although it was recognized that it was not entirely satisfactory for fabrics which were to be used for clothing. With the increasing use of light rayon or silk fabrics which have been treated to resist wetting by water, there has been a growing demand for tests other than the trough test which is definitely not suitable for these types of fabrics.

Many other methods of testing the water resistance of fabrics have been described in the literature but none of these have received universal acceptance. In this review an attempt will be made to mention all the methods of test which have found application or conceivably could find application, and to point out their advantages and disadvantages.

In every case where the effect of water on textile materials is being tested, it is possible to classify the method in one of the following groups:

1. Water stationary, fabric stationary.
2. Water in motion, fabric stationary.
3. Water stationary, fabric in motion.
4. Water in motion, fabric in motion.

It will be possible to further subdivide these main groups into sub-groups as the individual methods of test are described.

Group 1

A. PRESSURE FROM ABOVE

a. The trough test.

Mention has already been made of the trough test which was quite generally used for a great many years. This was originally justified for tent-cloth, sail-cloth and similar fabrics on the basis that these fabrics were actually liable to collect rain in a trough. However, it must be recognized that in real use a definite amount of water is not carefully deposited in a trough of the fabric and then left there in a completely quiet condition, but instead the individual drops are slowly assembled and the amount of water in the trough is continually increased.

Furthermore, the vibration of the fabric by the wind, or by other causes, is an important factor. If a fabric trough is carefully filled with water, it will often stand for a long time without being penetrated by the water. But as soon as it is disturbed by only a slight agitation, the water may begin to drop through. In making tests of this sort, accidental vibrations of the fabric may occur in some cases and thereby lead to completely erroneous results. It is an established fact that as soon as the opposite side

*Monatschr. Textil-Ind. *50*, 15-19 (February, 1935). A condensed translation of the original article, by Walter W. Scott, Gustavus J. Esselen, Inc., Boston, Mass.

of the fabric becomes damp, the water will immediately start to run through.

Other disadvantages of the trough test are that the results are dependent upon the shape and depth of the trough and the type of folding, all of which conditions are never exactly uniform. Also, the fabric is apt to be distorted by the pressure of the water and thus become wider meshed at the bottom of the trough. For this reason the test is quite unreliable for light-weight woolen goods and knit goods.

A typical example of the inaccuracy of the trough test is given below. One sample of a light-weight fabric was given a strong impregnation with a waterproofing agent and another sample of the same fabric was given a weak impregnation. The trough test was then performed on portions of each treated sample, 50 centimeters square, using 2 liters of water. After both samples had held firmly for 7 hours, an addition of 4 more liters of water was made to each. With the strongly impregnated fabric, the water began to drop through after ½ hour, and after 9 hours, 2.7 liters of water had passed through. With the weakly impregnated fabric the water did not begin to drop through until 2 hours had elapsed, and after 9 hours only 0.2 of a liter of water had passed through.

When the troughs were emptied and the fabrics shaken, it was found that the strongly impregnated fabric had only taken up 16 per cent of its weight of water whereas the poorly impregnated fabric had taken up 23 per cent. It is believed that the reversal of the results in the trough test was due to the fact that the fibers of the poorly impregnated fabric gradually swelled because of absorption of water and thereby acquired a tightness which hindered the water from actually running through. The strongly impregnated fibers did not swell as much and hence the water could pass more freely between the fibers after the fabric was distorted by the additional water pressure.

b. The water-column test

This test required the fabric to be stretched across a circular frame of definite diameter. A glass or metal cylinder with a centimeter scale is then fastened firmly on the frame. One can either allow water to flow slowly at a uniform rate into the cylinder and then determine at what height of the water column the first drop comes through the fabric, or one can pour a definite amount of water into the cylinder and determine the length of time required for the first drop to come through. The latter procedure is similar to the trough test but with somewhat greater accuracy. The distortion of the fabric is largely eliminated, especially if the diameter of the frame is relatively small. However, care must be taken not to be led astray by slight defects in the weave, and drops which pass through the fabric close to the frame should be disregarded.

c. The funnel test.

This test is a variation of the trough test in which the fabric is folded like a filter paper and placed in a funnel. A definite amount of water is poured in and a record is made of the time required for the first drop to pass through, or the amount of water flowing through in a given time. The funnel test is not comparable to actual conditions of use because in this case the cloth receives the pressure of the water on only a very small area.

d. The box test.

A method in which the pressure of the water is applied from the side rather than from above, has been recommended by the American Association of Textile Chemists and Colorists (American Dyestuff Reporter 1933, page 144). The fabric to be tested is fastened on the front side of a rectangular box. Water is allowed to flow into the box up to a definite height and maintained at this level while the amount of water passing through the fabric in a definite time interval is measured. The height at which the first drop passes through may also be recorded. This method can only be used with thick fabrics as the exposed test surface is 10 centimeters wide and 50 centimeters high and the pressure of the water is considerable.

B. PRESSURE FROM BELOW.

a. The hydrostatic pressure test.

In the water-pressure tester designed by Schoffer, the cloth is stretched across a round frame on the under side of which is firmly fastened a funnel which is connected with a water receptacle. By elevating this receptacle which moves on a scale, the pressure can be increased until the water is forced through the fabric. This method of test is practically identical with the water-column test described above and is more convenient to perform as the passage of the drops of water through the fabric can be observed from above. The hydrostatic pressure test is capable of greater exactness than the trough test and has been quite widely used. However, it is subject to most of the disadvantages previously noted for the trough test.

b. Absorptive capacity of fibers.

Theoretically the principle of wicks which uniformly draw up liquid fuel can be applied to the evaluation of water-proofed fibers, but practically it is handicapped by the fact that the height of the rise cannot be clearly observed. Furthermore, with a reasonably good treatment the fibers have practically no absorptive capacity.

c. Resistance to wetting.

It is possible to apply a method used for the determination of the wetting power of solutions to the evaluation of the waterproofness of fabrics. Samples of a definite size may be placed on the surface of pure water and a record made of the time required for the fabrics to wet out or sink. This method has many faults in addition to the length of time required for a strongly waterproofed sample to wet out. For example, a fabric may become completely saturated with water and yet continue to float for hours because of bubbles of air entrained by the individual fibers. Or the air which is dissolved in the water may collect on the under side of the sample and retard its sinking. For these and other reasons it is possible to obtain values ranging from 6 to 24 hours with samples cut from the same fabric.

C. PRESSURE FROM ALL SIDES

a. Complete immersion of fabrics.

The fabric may be submerged by means of a coarse mesh sieve and the time required for wetting out, or the water taken up in a given time may be determined. However. for the same reasons as mentioned above, the recorded values fluctuate considerably. For example, with waterproofed bathing suits some of the results of duplicate determinations were found to be in reasonable agreement but other duplicates showed a water take-up of 20 and 47 per cent, 49 and 66 per cent and 53 and 65 per cent.

Another possibility along this line is to attach a definite weight which the fabric would hold in suspension in the water until it is completely wet out. This method has the same disadvantage that small globules of air may be entrapped in the fabric or within the fibers and consequently hinder the sinking. There are additional difficulties in connection with the attaching of the weight as the sample should always be subjected to the same water pressure and hence should be immersed to the same depth.

b. Complete immersion of yarns.

Herbig has described a very good method for the determination of wetting-out efficiency. A piece of ordinary yarn is immersed in the solution for a definite period of time (15 seconds) with the aid of a stretching contrivance, then the superficial water is removed by whirling and the increase in weight is determined. This method can be reversed by using pure water and waterproofed yarn.

A series of experiments has shown that the method is suitable for a simple, quick comparison of treated yarns. It was found that two waterproofed samples of wool yarn took up 24.7 per cent and 31.4 per cent of water, respectively, with a two-minute immersion by the Herbig method. The same samples took up 25.2 per cent and 31.3 per cent of water by the Becker method, described in a later section (IV B.). However, the untreated yarn took up only 35 per cent of water by the Herbig method and about 70 per cent of water by the Becker method. This difference was probably due to the fact that in the former method the yarn was motionless in the water and therefore mechanically retained small globules of air.

c. Moisture-absorption test.

The absorptive power of textile materials towards water vapor should be comparable with that towards water in the liquid state. Hence, there is justification for the development of a test method which would simulate the action of a fog. Some form of conditioning apparatus would appear to be the most suitable arrangement. However, it must be remembered that fog is not entirely composed of pure water vapor but contains small amounts of dust and soot and these contain small electrical charges which play a very important role in the precipitation of the water on textile materials. The difficulties of developing a suitable test method of this type may be easily comprehended.

Group 2

The methods described under this heading are based on the principle of letting water drop on the horizontally or obliquely stretched cloth. The water may be dropped onto the cloth from a single opening or from several openings simultaneously as from some type of sprinkler.

A. ONE DROPPING POSITION

a. The bead test.

This test is performed in general as follows: Water is allowed to drop from a vessel which delivers drops of equal size at a uniform rate. The drops fall from a definite height (usually 50 centimeters) onto the test sample which is held with both hands either horizontally or somewhat obliquely. It is observed (1) whether the drops remain spherical in shape or spread out over the surface of the fabric, (2) whether the fabric is wet-out, (3) whether the water may or may not again be shaken off and (4) how many drops are required to produce any marked effect.

The test makes no claim for absolute accuracy as it is entirely dependent upon the power of observation of the individual tester. However, it possesses the advantages of simplicity and quickness and it is quite valuable for plant control in order to draw quick conclusions concerning the efficiency of a waterproofing treatment.

b. The penetration test.

Procedures for carrying out tests of this type have been described by several official bodies in Switzerland and in England. Nevertheless there is a lack of uniformity in the directions with respect to (1) the height of the fall, (2) the size and frequency of the drops, (3) the angle at which the water falls on the material and (4) the method of supporting the fabric and detecting the penetration.

For the purpose of studying the accuracy of this test, a dropping apparatus was constructed to deliver drops of a constant size and number. The size of the drops was kept uniform by means of a capillary tube and a constant rate of dropping was maintained by using an overflow vessel which kept the level and consequently the pressure of the water unchanged. The height of the fall was 1½ meters. The fabric sample was fastened to a glass plate which was inclined at an angle of 45° and a blotting paper was placed between the fabric and the plate in order to make the passage of the water through the fabric more visible. Under the glass plate there was a horizontal mirror which made it possible to observe the under surface from above.

It is important that the drops should always land on the same spot. In order to protect the falling drops from air currents, a wide glass tube can be placed between the orifice and the fabric so that the drops will fall through this tube. The vessel containing the water should be kept completely free from vibration.

This test finds its greatest usefulness in connection with felts, suitings and other thick fabrics but its accuracy is not very great. It may serve to distinguish a class of fabrics which give comparable results, but in many cases there are marked discrepancies which may be due in part to weaving defects and in part to other causes. For example, the numbers of drops required to penetrate a cloth

designed for uniforms were as follows:

Untreated cloth: 14 drops as an average of 20 determinations which ranged from 9 to 21 drops.

After a weak waterproofing: 136 drops as an average of 10 determinations which ranged from 100 to 178 drops.

After a strong waterproofing: 15,900 drops as an average of 5 determinations which ranged from 12,900 to 18,200 drops.

These high drop numbers were not actually counted but were calculated from the length of time and the number of drops (120) per minute.

It was found that this method was not suitable for lightweight fabrics, especially those with little thickness. This was true even when, as suggested by Kern (Melliand Textilberichte, 1933, page 132), the formation of the drops took place in a small stalagmometer and the penetration of the water with respect to the wetting of the underlying paper was determined by the completion of an electric circuit rather than by direct observation.

For example, with representative fabrics the values fluctuated between 90 and 165, 11 and 21, and 8 and 14 drops, respectively. With the limit of error as high as ± 50 per cent, the method is obviously unsuitable for the accurate determination of smaller differences. The claim that this method will compute the "exact" value of a waterproofing impregnation, is unjustified and misleading.

B. SEVERAL DROPPING POSITIONS

a. Spray test.

In order to approach somewhat closer to the effect of rain, the water can be allowed to drop from a sprinkler head, with uniform speed and at a definite height, upon an obliquely stretched fabric. One can then observe how much water penetrates through the fabric after definite intervals. This method avoids many of the faults of the penetration test described above but still does not correspond closely enough to the conditions in actual use.

Mecheels (Melliand Textilberichte, 1934, page 20) has proposed an improvement of the spray test in which a part of the under surface of the horizontally stretched fabric is mechanically rubbed by a metal rubber during the spraying. The disadvantages of this apparatus lie in the fact that only the water-permeability is determined and not the equaliy important ability of the fabric to take up water. Moreover, only a portion of the fabric being sprayed is mechanically acted upon.

b. Modified spray test.

Heermann and Herzog (Microscopical and Mechanico-technical Textile Researches, 1931, page 419) amplify the spray test by determining the amount of water taken up by the cloth. An obliquely stretched fabric is sprinkled by a sprinkling device so arranged that the spray travels in a high arc for a distance of 6 to 10 meters. A record is made of the time required to wet through the fabric as well as the amount of water absorbed. Apart from the large amount of space required this method has the disadvantage that a small change in the pressure of the water supply causes a pronounced displacement of the sprinkling cone. The spray is also easily deflected by a current of air.

Group 3

This group comprehends the combination of "fabric in motion" with "water at rest." Such a combination is not practicable as the motion of the fabric will automatically produce motion in the water.

Group 4

a. The Becker water-absorption test.

Many factors must be taken into consideration in an attempt to duplicate natural conditions of use. Upon careful consideration it becomes apparent that it is out of the question to design an apparatus which will completely duplicate all of these conditions. Therefore it becomes necessary to carry the material through a definitely specified test, the results of which will give a picture of the effectiveness of the waterproofing treatment. The water-absorption test described by Becker comes very near to fulfilling this requirement. It is capable of being accurately standardized so as to give reproducible results and it can be applied equally well to fabrics or yarns.

The apparatus has never before been described in the literature although it was first built several years ago and has since been used in a number of court cases. The design of the apparatus was influenced by the opinion that almost all methods of determining water absorption suffer from the basic fault that, in the absence of motion, the fabric entrains air and thus prevents a uniform wetting out.

In the Becker apparatus the fabric or yarn is stretched on a reel which can be rotated by means of a horizontal shaft. The under part of the reel is immersed in water. The number of revolutions is fixed and is kept constant by means of a tachometer. The reel has a diameter of 22 centimeters and it is wide enough so that 2 strips of fabric each about 4 centimeters wide, or 2 skeins of 6 to 7 grams comprising about 25 strands each, can be run at the same time. In this way it is possible to make comparative determinations under exactly comparable conditions.

The reel is rotated by hand at a speed of 100 revolutions per minute, and is immersed to a depth of 12 centimeters in a water bath at 20° C. It is rotated for a definite period of time (15 seconds for ordinary fabrics and 1 minute for heavy materials) then raised out of the water and whirled for 1 minute with quick revolutions (400 per minute) to remove the water clinging to the surface. The strips of cloth or yarns are removed from the reel, stretched taut with both hands a definite number of times (between 3 and 30) and the increase in weight determined.

The rotation times and speeds given above have been selected as optimum, i.e., best adapted for distinguishing differences in the capacity of water absorption. With changes in the time of immersion, there are alterations in the values determined but the comparisons between samples remain the same. There are listed below a few examples to demonstrate the accuracy of the method and

the consistency of the comparisons. The figures indicate the percentage of water absorbed based on the original weight of the fabric.

Brown Wool Gabardine
Untreated: (1) 141.3, (2) 144.0, (3) 142.8, (4) 150.0
First treatment: (1) 63.5, (2) 64.8, (3) 64.0, (4) 63.2.
Second treatment: (1) 52.2, (2) 53.9.
Third treatment: (1) 43.2, (2) 43.9, (3) 42.2, (4) 4.60.
Fourth treatment: (1) 33.0, (2) 34.8, (3) 32.6, (4) 33.5.

Blue Cotton Tricot
Untreated: (1) 100.5, (2) 101.0.
Treated: (1) 40.0, (2) 41.8.

Blue Uniform Cloth
Untreated: (1) 100.0, (2) 107.2.
Treated: (1) 30.0, (2) 31.5, (3) 37.2, (4) 35.4.

Red Wool Yarn
Untreated: (1) 166.0, (2) 168.0.
First treatment: (1) 66.9, (2) 66.6, (3) 67.0, (4) 65.5.
Second treatment: (1) 31.7, (2) 30.3.

b. The Stohr test.

A device manufactured by the Stohr A.G. in Leipzig (German Patent 603,216) is constructed on a similar principle to the one described above but in this case the reel is replaced by a drum which is not immersed in the water but is sprayed. A determination is made of the amount of water which runs through the fabric.

c. Other water-absorption tests.

There are a number of methods which attempt to measure water absorbency by the simplest means. In general the material, fastened on a frame, is moved in a definite manner for a definite time under water, for example, by several immersions up to a certain depth. A typical procedure was described to the writer by Prof. Krais of Dresden.

Over a glass rod, bent into a rectangle (12 x 15 centimeters in size) and fitted with a handle, a yarn of known weight is wound so that every strand lies free. The frame is immersed for 1 minute in water at 20° C. with its upper edge 10 centimeters below the surface and then raised completely out of the water within 10 seconds. The yarn is immediately freed from attached water by whirling with the hand (40 revolutions in 20 seconds) and weighed. Knitted fabrics are tested in the same manner by fastening them with clips to the glass frame. Care must be taken to keep the direction of the threads always the same.

This method is comparable to the one described in section 1 C b above, but with elimination of the errors caused by the adherence of small air bubbles. It is a simple method for estimating the approximate value of various treatments but it is not suitable for exact studies. It can not be readily adapted to performance by mechanical means which can be exactly specified and the hand twirling is a source of considerable error. The yarn sticks together and hinders the uniform removal of the surplus water.

The variations in parallel determinations generally run between 10 and 20 per cent as illustrated in the following cases:

One sample: (1) 32.2, (2) 40.2, (3) 33.0, (4) 40.0.
Another sample: (1) 40.9, (2) 45.6, (3) 40.0, (4) 41.5.
Often the divergence is even greater as follows:
(1) 40.3, (2) 50.4, (3) 40.0, (4) 48.6, (5) 54.5, (6) 39.2.

Obviously the advantage of the motion in the water is offset by the inequalities in the whirling. For plant control by determination of approximate values, the method described above, or a similar one, can be utilized provided that it is carried out by one and the same person. However, it is not recommended for standardization because of its indefiniteness and lack of reproducibility.

d. Raindrop test.

This test, devised by Bundesmann (Melliand Textilberichte, 1935, p. 128), comes very near to duplicating the natural usage to which most goods are subjected, i.e., to the action of a steady rain with continual motion and rubbing. The device completely eliminates the inequalities of the rainfall and permits the carrying out of several parallel or comparable determinations under exactly similar conditions. Both the water penetration and the water absorption may be measured.

The apparatus provides that pieces of the fabric to be tested are stretched over cans of about 10 centimeters in diameter. The cans are fastened to the arms of a horizontal wheel so that they pass uniformly in rotation under a spraying device. Coincidently with the rotation of the cans, a stationary rubber rubs on the entire under-side of the sprinkled fabric. The water which penetrates through the cloth after a definite number of rotations can be drawn out of the can through a stopcock in the bottom and its amount can be measured.

In conclusion, the foregoing remarks have given some idea as to which test methods for the evaluation of waterproofing treatment have been proposed and what advantages and disadvantages the individual procedures possess. Certainly in view of the increasing importance of waterproofing for textiles, there is a great need for an agreement on suitable uniform methods of test. This need is now recognized by the prominent organizations in the textile field, such as the textile section of the government testing bureau in Berlin and the German research institute and technical school for the textile industry.

Next Quarterly Research Number will appear October 3, 1938

Physical and Chemical
Textile Testing-IX

JOHN H. SKINKLE*

PART II—CHEMICAL TESTING

(Continued from May 2, 1938, issue)

Chapter 9—Introduction and General Considerations

BEFORE discussing individual chemical tests, it is necessary to consider some of the generalizations which apply to all chemical tests. In the first place, it will be observed as the tests are taken up that there are two general types of determinations—direct and indirect. In a direct determination the constituent is determined by a direct weighing or titration; in an indirect determination, the constituent is determined by the loss in weight of the sample or by a change in some property of the sample. It is generally considered better to make a direct determination if it is at all possible, although if carefully done, an indirect determination may be as accurate or sometimes more accurate.

All chemical tests are based on a dry weight of sample, so that if possible the sample is oven-dried and weighed before the test is carried out. If this is not possible, due to possible chemical effects of heating, two samples are weighed out, *at the same time,* on one of which the chemical test is carried out and on the other of which a regain determination is made; the sample used for the chemical test is then calculated to its dry weight from the results of the regain determination. The formulae have already been given but are restated here:

Let A = weight of weighing bottle + sample
B = weight of weighing bottle + dry sample
C = weight of weighing bottle alone
R = regain in per cent
W = weight of sample weighed out for the chemical test
D = weight of dry sample for the chemical test

$$\text{Then } R = \frac{A\text{-}B}{B\text{-}C} \times 100$$

$$\text{and } D = \frac{W}{1 + R/100}$$

As an example, we consider a copper number determination in which the following data were obtained:

Weight of bottle and sample	= 23.9765	grams
Weight of bottle and dry sample	= 23.8785	grams
Weight of bottle alone	= 21.6830	grams
Weight of sample for test	= 2.59	grams

$$R = \frac{23.9765-23.8785}{23.8785-21.6830} \times 100 = \frac{.0980}{2.1955} \times 100 = 4.4\%$$

$$\text{Dry weight} = \frac{2.59}{1 + 4.47/100} = \frac{2.59}{1.0447} = 2.48 \text{ grams}$$

Although determinations are generally made in the laboratory on the dry weight of the sample and results expressed in terms of a dry basis, the non-chemist may sometimes want the results in terms of the "normal" material, by which is meant in terms of a sample with its standard regain. This may be figured easily from the dry basis results; two cases are possible which are best illustrated by concrete examples.

A sample of cotton cloth contains 2.56 per cent ash (dry basis), what is the percent ash at standard regain? Here we have 2.56 parts of ash which does not pick up any regain together with 100-2.56=97.44 parts of cotton cloth which picks up 6.5 per cent regain.

At standard regain,

1.065 x 97.44 = 103.85 parts of cotton
2.56 parts of ash
106.41 parts total

$$\%\text{ ash (standard regain)} = \frac{2.56}{106.41} \times 100 = 2.40\%$$

A sample of cloth containing silk and cotton, on analysis, gives 21.5 per cent silk and 78.5 per cent cotton (dry basis). What are the amounts of silk and cotton at standard regain? Here we have two substances, both of which pick up regain but in different amounts.

At standard regain

1.065 × 78.5 = 83.7 parts of cotton
1.11 × 21.5 = 23.9 parts of silk
107.6 parts total

$$\%\text{ cotton (standard regain)} = \frac{83.7}{107.6} \times 100 = 77.8\%$$

$$\%\text{ silk (standard regain)} = \frac{23.9}{107.6} \times 100 = 22.2\%$$

Since it is impossible to do much chemical textile testing without previous training in chemistry, it is assumed throughout this section that the reader is familiar with the usual qualitative tests and also with the technique of quantitative analysis. Where the expression "run a blank" is used, it means that the procedure (usually a titration) should be carried out on the chemicals used but without

(Continued on page 422)

*Lowell Textile Institute, Lowell, Mass.

PROCEEDINGS OF THE

American Association of Textile Chemists and Colorists

JULY 25, 1938

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Members should notify the **Secretary** immediately of all address changes

CALENDAR OF COMING EVENTS

Outing, South Central Section, Lookout Mountain Hotel, August 5 and 6, 1938.

Meeting, Southeastern Section, Columbus, Ga., Sept. 10, 1938.

Annual Meeting and Convention, Atlanta Biltmore Hotel, Atlanta, Ga., December 2 and 3, 1938

JOINT MEETING

A JOINT meeting of the New York Section of the American Association of Textile Chemists and the American Association of Textile Technologists will be held on the evening of August 16th at the Chemists' Club, 52 East 41st Street, New York City. They will act as hosts to a group representing the International Association of Chemists and Colorists who will be making a tour of the country at that time. Among the cities which this group will visit are: New York, Boston, Albany, Pittsburgh, Washington and Philadelphia. It is their intention to visit mills and educational institutions which are located in or near these centers. In Washington they will visit the National Bureau of Standards and other points of interest. The visiting delegation will arrive in this country on the 5th of August and plan to leave on the 18th of that month.

The following program of speakers has been announced by the two associations who will act as hosts: Werner von Bergen, who will discuss American standards in wool classification; Oskar Geier, who will speak on American patent laws; Irving J. Saxl, who will discuss new instruments and apparatus and Eric Pusinelli, who will speak on economic conditions.

Indigosols

*Their Application in Dyeing and Printing**

BEN VERITY**

I HAVE been requested to give a talk on Indigosols. The name suggests that the colors have something to do with Indigo. In fact the first Indigosol was made from reduced Indigo and is a sulfuric ester sodium salt of that body and is a stable, water-soluble product—practically colorless, hence its name: Indigosol, or soluble Indigo.

This was brought out and patented by Durand and Huguenin in 1922.

Other Indigosols have followed—a great many have been made and about 30 are on the market today.

To regenerate, as it were, the original vat dye from which the respective Indigosols are made, the color is oxidized in an acid medium with various oxidizing agents at a suitable temperature.

In Europe 70 per cent of the dyehouses use Indigosols for one purpose or another.

A large proportion of the printed white grounds for dress fabrics are produced with Indigosols together with another group of colors which appear under the names of Rapidogens, Pharmasols and Diagens.

These lend themselves admirably to use in combination as they can be developed under the same acid steaming conditions.

Some of the most commonly used Indigosols are the equivalent of the following well-known vat dyes:

Indigosol Blue IBC is the sulfuric ester salt of Indanthrene Blue BCS.

Indigosol Green IBA is the sulfuric ester salt of Jade Green.

Indigosol O4B is the sulfuric ester salt of Ciba Blue 2BD.

Right here I might say the Algosols of General Dyestuff Corp. are identical with the Indigosols of Carbic Color & Chemical Co., Inc.; and the Soluble Vat Dyes of duPont are also the same or similar products.

The Soledons made in England are like Indigosols in that they are water-soluble stable products and are handled in much the same way.

Why are Indigosols used in printing? Because by their use and combinations with the Rapidogens, Pharmasols or Diagen type of color, prints can be made at a lower cost—usually from one-quarter to three-quarters of a cent per yard cheaper than with vats—and generally brighter results produced.

Why are they used in dyeing? Because light shades can be produced more easily of uniform shade, more level appearance, and of vat fastness; and frequently are used on goods that cannot be dyed with vat colors successfully or practically on account of their character.

The above gives you a general picture of this class of dyestuffs.

Now let us see how they can be applied.

Here is a plain rayon peach shade. This was dyed on a jig like a direct dye with Glauber's salt, soda ash and nitrite of soda, then developed in the open continuous machine with sulfuric acid. This woven colored stripe shirting was padded and developed and soaped all in one operation.

This spun rayon was padded twice direct to the nip with the usual color formula as above, one side up first time and the same side down next time, and then developed on a jig. Padding twice is rather an unusual procedure, but in any cloth that shows as much difference as this it is to be recommended. The difference is almost 50 per cent. Pigmented rayon can be processed in this manner and a much deeper shade obtained with a second run.

This woolen yarn has been dyed with Indigosols in an acid bath, then oxidized carefully with the suitable oxidizing agent, such as nitrous acid or bichromate soda.

Here is a sample of silk that was dyed also with acid and developed on the jig in a similar manner. The details are given in the Handbook, Volume III, on Indigosol Dyeing.

I was rather amused and also pleased to have the following dialogue take place at a plant I was visiting: The gentleman I was interviewing said:

"They are demanding Indigosols on the best broadcloth."

"What do you mean by that? The customers do not know with what they are dyed."

"No, that is the interesting part; but they come to me and say: 'We want our vat dyed goods level like this.'" But we know that they can only be obtained that way by the use of Indigosols.

Speaking of level results reminds me of an experience I had some years ago. Some fast shades were to be dyed on an all-rayon fabric and among them a pink and red had to be done. The pink was first tried and we padded it with Sulfanthrene Pink FF in the reduced state. The result was so uneven that it was not saleable—nearly every

*Presented at meeting, New York Section, May 20, 1938.

**Carbic Color & Chemical Co.

cop showed a different shade. We dyed it red with Naphthol AS colors to cover up this defect.

Another lot of 400 yards of the same grade of cloth was tried by padding with Indigosol Pink IR Extra and nitrite of soda, and developing on the jig with sulfuric acid; and this gave an excellent result—perfectly level.

Therefore, for dyed fabrics which shown an uneven or raw appearance, Indigosols may be used to produce a more level and desirable effect, if other conditions do not interfere with their employment.

This skein of rayon has been dyed with Indigosols in a Smith-Drum machine using the nitrite and sulfuric acid method of developing.

The above gives you a good idea of the range of materials on which Indigosols are dyed on a practical scale.

They can also be dissolved in viscose in the bulk before spinning, and in Europe large quantities of rayon used in undergarments are thus colored—the shade being developed in the acid spinning bath.

In all the above processes the Indigosols have been developed wet. But if you pad Indigosol Blue IBC on cotton cloth and develop a portion wet and another portion dry before developing, you will obtain a brighter blue and probably 30 per cent stronger than the same padding developed wet. But to dry Indigosols on cans has been found heretofore to be impractical and an air drier has been employed to overcome the difficulties; which machine has also solved the problem of drying Naphthol AS prepared cloth before coupling.

The low substantivity of Indigosol Blue IBC has however caused difficulties and one must modify the usual procdures, and the following suggestions are made to eliminate the trouble if an Andrews and Goodrich dryer is used:

Pad with the Blue IBC bath containing 10 per cent of calcined Glauber's salt calculated on the weight of the pad liquor; sky 40 yards before entering the drier and bring out of the machine barely dry and then develop. The Indigosols should be protected from sunlight as much as possible before developing.

The addition of Glauber's salt retards the migration of the color and the use of this material in drying Naphthol AS prepared goods acts in a similar manner and will prevent the longitudinal scrimps from showing that one produces in drying on cans, on closely woven fabrics—such as 80x80 or broadcloth.

Probably Indigosols may be successfully dried on cans with its aid where the solubility of the color will admit of its use—but this has not yet been demonstrated with a large lot (say of 20,000 yards) and a small lot would not prove that it is practical even if successful with it. I would suggest developing the last double cut that has gone through the drying machine to see if it is all right before developing the bulk. Spun rayon is also dyed with Indigosols where vat fastness is required.

Some types are dyed and developed on the tensionless jigger. Where the construction and finish admits of it the bleached fabric is padded through color, batched behind the machine, and the goods are then dried on the new Van Vlaanderen carrier type dryer. Developing is then carried out through sulfuric acid, on the open box, and creeper usually found connected with any set of rope soaping becks, followed by a good washing and rope soaping.

Delicate underwear fabrics are dyed by a one bath process which is used to a considerable extent in Europe.

We have touched the high spots in dyeing with Indigosols. Let us look at the picture of their application in printing.

In printing, one uses much more concentrated solutions and, as the Indigosols vary in solubility, solvents are used to help in the solution of dyestuffs, and the colors are made up usually as follows:

Color
Water
Solvent
Thickener

and oxidizing agents, which are added frequently just before printing.*

They are printed and dried and, as they are usually employed with colors needing an acid ageing, it is desirable to use ingredients that will fully develop the color during the acid ageing—which sometimes is acetic acid only, but more often acetic and formic acids.

The times of ageing varies and, where conditions prevent full development in the ager, further and complete development is effected by passing the goods after ageing through various wet oxidizing processes—usually chrome and sulfuric acid, sometimes through ferric salts and sulfuric acid, sometimes with nitrous acid, and sometimes oxalic acid and sulfuric acid. The latter is effective only if the color contains neutral chromate or bichromate and is particularly useful where difficulty is experienced in complete development of the O4B Blue in the acid ageing.

When a strong Indigosol O4B is printed, I have been told that 160° F. fails to fully develop it in sulfuric and bichrome and, in order to ensure its complete oxidation, a temperature of 180° F. is necessary. With oxalic and sulfuric a temperature of 120° to 140° F. is sufficient.

In addition to the Indigosols having varying solubilities some also oxidize with ease, others with difficulty, and therefore one formula cannot be used for all the Indigosols where acid ageing is employed.

In cases where acid ageing is not available, a steam process is used, development of the Indigosols is accomplished by steaming. Chlorate of soda in the presence of vanadate of ammonia and ammonium sulfocyanide oxidizes the color under such conditions.

To refer once more to Indigosol O4B: In some plants when a strong shade is required and there is not complete

*Where they are largely used 8 oz. to 16 oz. standards are made for easier working and saving of time.

development in the acid ager, a little chlorate of soda added to the bichromate of soda will effect complete development in the acid ager. One-half to 1 ounce per gallon of finished color being adequate to produce this desirable result.

Indigosol Blue IBC is another color that presents problems from two angles.

By the generally used methods of printing the other Indigosols, it does not completely develop its beautiful color and, as it is easily over-oxidized, it cannot be passed through hot chrome and sulfuric acid but it is quickly further developed with weak cold nitrous acid made with 1 pint of sulfuric acid and 1 pound of nitrite soda to 50 gallons of water.

One of my friends whom I called upon in the early days of the application of Blue IBC was having his difficulties and he said to me, "That is a tricky color, Mr. Verity, isn't it?" and I agreed with him and he showed me a beautiful print which he had produced in an interesting manner. It was printed with neutral chromate of soda, acid aged and then, at this particular plant, they used hot ferric sulfate plus sulfuric acid for developing their Indigosols, but this treatment would over-oxidize this color. In order to produce the desired result the goods were first open soaped and dried; this washed the chrome out of the blue blotch, and the IBC in the partly developed state is very substantive towards cotton, and not very soluble, and therefore did not wash out with this treatment, and on passing the material through the copperas ferric nitrate, the color was developed completely without over-oxidation to the beautiful blue this color can give, but which you do not always obtain.

One superintendent told me the copperas ferric nitrate method gave him the best shade and brightest results when printing with IBC Blue.

As it is easily developed by using cold nitrous acid, it lends itself admirably to the production of styles where one color falls on another—as in photographic engraved styles.

Indigosol Blue IBC can be easily printed and fully developed in the acid or vat ageing when printed with the soda chlorate and vanadate ammonia formula.

The Indigosols are very useful for screen printing as the colors are not so sensitive to atmospheric influences as are the vat colors.

In regard to printing various fabrics with Indigosols: linen, cotton, pigmented rayon, and rayon, can be printed with these colors.

With pigmented rayon, spun rayon, and Bemberg rayon, the printing formulas are usually modified somewhat to produce an acceptable result. The addition of Carbitol and Diethylene Glycol up to 10 per cent of the volume of the color frequently improves the brightness, level and smooth appearance and strength of the Indigosols. Indigosol Blue IBC and Indigosol Blue AGG will usually develop more easily than Indigosol O4B.

In some cases where pigmented rayon is used, the steam chlorate method gives the best results. But chlorate and ammonium sulfocyanide may need to be doubled to obtain the same development of the Indigosol as on cotton.

Right here I might say that the chlorate soda steam method of printing Indigosols is one of the most dependable where fresh color is used, but the colors do not keep so well and hence it is frequently not used except the other methods have worse drawbacks.

Indigosols, besides being used for printing white grounds, can be resisted with vat colors and Reserve X for white. The vat color with extra hydro can be printed and aged and then padded with an Indigosol color containing nitrite soda and some tragacanth padded to the nip face down, and then run into a bath of 2 per cent sulfuric acid at 140° to 160° F. 5 seconds, skyed 10 seconds, washed and soaped and dried.

Indigosols can be printed on Naphthol AS prepared cloth using the steam chlorate and ammonia vanadate. Age as for vats and then wash and soap as usual. Indigosol Blue IBC and Indigosol Green IBA will come up easily by this method.

The Green IBA and Indigosol Yellow HCG gives good deep greens.

For yellows, use the Indigosol Golden Yellows IGK or IRK.

DISCUSSION

Chairman Baxter: Thank you very much, Mr. Verity, for your very interesting talk. I am sure there are some present who would like to ask questions in connection with the dyeing and printing of these Indigosol colors.

Dr. Smith: Are these applicable to the acetate type of rayon in any way?

Mr. Verity: I have with me an Indigosol printed on acetate, but we have not thought it advisable to recommend them for that kind of fabric.

Dr. Harold: I am interested, Mr. Verity, from the analytical standpoint. I remember a case where $25,000 worth of Indigosol printing was done, and there was a sharp drop in price thereafter. The customer, naturally, felt that there was some reason to object to the goods. The customer wanted to reject the goods saying that they were not true Indigosols, because a young man in one of the laboratories—I think he was about sixteen years old—found a little chromium in the ash. He, therefore, claimed that they couldn't be Indigosols, that they must have been chrome colors.

How do you in your laboratory determine whether a piece of goods has been truly printed with Indigosols or not?

Mr. Verity: You can't tell whether it has been printed with vats or Indigosols, but if the nature of the fabric shows the character of Indigosols, you say it has been done with Indigosols.

There are certain fabrics that you cannot dye as level with vats as you can with Indigosols.

In regard to prints, take this for instance, I do not have any satisfactory method of telling whether the blue is

printed with a vat or an Indigosol, but when I see this beautiful red, I test it and find that it is a Rapidogene or Pharmasol type of color, and then I know or infer that the blue has been printed with an Indigosol.

Dr. Harold: There is no general class method for determining whether material has been printed with Indigosol or not?

Mr. Verity: No. Someone else may know it; I don't.

Mr. Baumann: You have a dyeing there of Indigosol with a white resist. How was that white resist made?

Mr. Verity: Made up?

Mr. Baumann: Yes.

Mr. Verity: We will sell you the white. (Laughter.)

Mr. Baumann: How would it be prepared in a color shop?

Mr. Verity: I have prepared it myself, and the formula is given in the books for making it up.

Mr. Baumann: What is the active ingredient?

Mr. Verity: There are various ones. You can resist some Indigosols with acetate of soda, and where you have the fastest Indigosols, you need a special reserve or resist. The reserve used for these colors smells of glue. Beyond that, I have never analyzed it.

Mr. Baumann: Is it put on after it is padded?

Mr. Verity: No, it is printed first, together with the vat if you have a white or color resist, then aged, then padded, running direct to the nip, face down, with a solution of Indigosol, nitrite of soda, and tragacanth, then skyed a little to allow the color to be absorbed into the cloth, and then run direct into 2 per cent sulfuric acid at 140° F., washed and soaped. That method is used in Europe now to make patterns of this nature because it is cheaper to do that than to use developed colors, with which you have to guard against facing and streaks. If you do it in the first place by printing the white and the vat color, and then age it, you get these beautiful light shades, perfectly clear and bright, with no facing, as it were, or no destruction of face.

Mr. Baumann: It is a mechanical resistance?

Mr. Verity: I think it is more than that. I know of a resist myself which I have made that is both mechanical and chemical.

Chairman Baxter: Are there any other questions?

Dr. Hager: Mr. Verity, you mentioned the one bath dyeing process of Indigosols. Is that practical, and has it been done here in the United States?

Mr. Verity: I don't know anyone that has done it here, but in Europe they do quite a considerable quantity of it on delicate fabrics.

Dr. Hager: I thought so. It has not been done here.

Mr. Verity: I think possibly it has not been done here because sometimes, as you know, it is a question of price. In Europe, it is often a question of obtaining the best quality. As you know, several processes that have originated in Europe have taken some time before being adopted in America.

Mr. Lifland: Do Indigosols give bright colors as well as vats, and can you dye heavy shades with them?

Mr. Verity: Yes, you can dye heavy shades if you have a pocketbook large enough to do it.

Mr. Lifland: Are they bright?

Mr. Verity: Yes, they are brighter in some cases, because, you see, they are practically pure. They have been made from the equivalent vat. You simply regenerate the vat.

Mr. Gabriel: Is there any way to prevent the Indigosol Green AB from bleeding on mixtures of silk and rayon in printing?

Mr. Verity: That question is beyond my experience. I do not know.

ONE HUNDRED AND EIGHTEENTH COUNCIL MEETING

THE Council held its 118th meeting at the Chemists' Club in New York, on Wednesday morning, June 1, 1938. Present were President Alban Eavenson, presiding; Louis A. Olney, Chairman of the Research Committee; William H. Cady, Robert E. Rose, and P. J. Wood, Past Presidents; Arthur E Hirst, Walter M. Scott, and Harold DeWitt Smith, Councilors at Large; Carl Z. Draves, Ben Verity, Henry F. Herrmann, R. M. Ritter, and Alfred R. Macormac, representing Northern New England, Rhode Island, New York, Philadelphia and Southeastern Sections, respectively; and Harold C. Chapin, Secretary. The Secretary's report of the 117th Council meeting, the Treasurer's report of May 31, and the Secretary's balance sheet attached hereto, were accepted. A report was received from William R. Moorhouse, Chairman of the Committee on Revision of the Constitution. The proposed new Constitution was discussed; and the petition for its adoption, signed by members in excess of the required ten, was brought before the Council as required under the present Constitution. The meeting was followed by a luncheon in honor of J. R. S. Goodall of the Textile Institute.

Each of the following was elected to the class of membership specified, as of thirty days from publication of application, provided that no objection be received meanwhile by the Secretary.

Active

E. M. Brown	A. H. Leonard	W. Perl
C. J. Byron	R. N. Mallard	C. M. Robbins
J. V. Collier	Z. B. Mangum	I. Rubinstein
F. Dannerth	A. Marchett	W. B. Sellars
R. O. Dietz	R. J. McCamy	W. M. Slaughter
O. G. Edwards	C. E. Morrill	E. L. Schmidt
A. W. Gunn	H. H. Mosher	H. H. Sims
C. G. Hard	J. H. O'Donnell	H. R. Varvaro
M. J. Hoffman	L. E. Page	W. A. Wardell
W. A. Howard	S. J. Patrek	R. F. Wein
F. R. Iler	J. Platania	F. C. Wittig
M. L. Kirby		

SECRETARY'S BALANCE SHEET—MAY 28, 1938

	Applications	*Dues, regular and reinstate.*	*Dues, Corporate and Sustain.*	*Miscellaneous*	*Bank charges*	*Totals*
Received by Secretary, Nov. 1, 1937, to April 23, 1938	$1,197.50	$8,711.71	$2,155.00	$1,399.73	—4.65	$13,519.29
Received by Secretary, April 23 to May 28, 1938	230.00	75.00	375.00	16.10*	— .60	695.50
Total received	1,427.50	8,846.71	2,530.00	1,415.83	—5.25	14,214.79
Transmitted to Treasurer	1,397.50	8,836.71	2,530.00	1,410.83		14,175.04
Leaving to order of Secretary	30.00	10.00		5.00	—5.25	39.75

***Miscellaneous Items**

Reports, Determination of Wool in Mixtures	$1.20	Year Books	5.00
Reports, Printing Paste	2.40	Buttons	3.00
Crock-Meter cloth	1.00	American Dyestuff Reporters	1.25
Analytical Methods	2.25	Total	$16.10

Junior

E. Collier, J. W. Harper, K. E. Traynham, J. M. Fields, W. S. Osborne, W. L. Whisnant, W. J. Fitzgibbon

Associate

T. R. Baravalle, P. Davis, W. G. Leon, H. J. Bonino, H. Heidt, F. J. Murphy, E. F. Cail, J. M. Howard, W. H. Scott, H. W. Causey, G. S. Kyle

N. W. Kent was transferred from Junior to Active membership.

Respectfully submitted,

HAROLD C. CHAPIN, *Secretary.*

OUTING, SOUTH CENTRAL SECTION

THE South Central Section will hold its annual summer outing at the Lookout Mountain Hotel on August 5th and 6th. Textile chemists from all over the South will gather to play games, swim, dance and enjoy themselves at the outing. The golf tournament will be held on Saturday morning. Mr. Robert Covington, of the Davenport Hosiery Mills, is general chairman of the outing and Mr. Nestor Groteluschen, of the Magnet Mills Co., is chairman of the South Central Section.

Special events have been planned for the ladies, including dancing on both nights, with the regular hotel orchestra and a special orchestra on Saturday night.

The various events are in charge of the following men:—*Golf*—Fletcher Kibler; *Entertainment*—Frank Myers and Homer Whelchel (this includes men's games and horseshoe pitching); *Ladies' Events*—Mrs. W. B. McNabb, Mrs. G. W. Searell and Mrs. Frank Myers (this includes bridge and women's games); *Publicity*—Al Beane; *Finance and General Arrangements*—Nestor Groteluschen, W. S. McNabb. C. C. Cayce, Robert Covington and G. W. Searell; *Reception*—D. A. Torrence and Joseph Mosheim; *Outing Secretary*—G. W. Searell.

ONE HUNDRED AND ELEVENTH MEETING OF THE RESEARCH COMMITTEE

THE 111th meeting of the Research Committee was held at the Chemists' Club in New York, on Wednesday afternoon, Junst 1st, 1938, following the Council meeting, and a luncheon attended by Council and Research Committee with J. R. S. Goodall of the Textile Institute as guest and speaker. Present were Chairman Louis A. Olney, W. D. Appel, G. L. Baxter, K. H. Barnard, J. R. Bonnar, W. H. Cady, Hugh Christison, C. Z. Draves, Alban Eavenson, J. F. X. Harold, Richard Haworth, H. F. Herrmann, A. E. Hirst, H. F. Lawton, A. R. Macormac, G. A. Moran, R. M. Ritter, R. E. Rose, W. M. Scott, H. DeW. Smith, Ben Verity, P. J. Wood, and H. C. Chapin. The principal topic of discussion was the manner and means of continuing the applied research which the Textile Foundation is leaving to the support of the industry, in its new policy of concentration upon problems of fundamental science.

Respectfully submitted,

HAROLD C. CHAPIN, *Secretary.*

SUMMER OUTING, PIEDMONT SECTION

THE annual two-day Summer outing of the Piedmont Section was held at the Ocean Forest Hotel, Myrtle Beach, S. C., June 24th and 25th. The meeting was well attended by the members, their families and guests. There were approximately three hundred and fifty people attending the outing.

They all enjoyed the various sports and recreations that were offered by the hotel, including golf, swimming, dancing, night club in the Patio, and a bridge tournament for the ladies. Prizes were given both in bridge and in golf.

The Summer Outing Banquet was held in the hotel dining room on Saturday night, and the extra entertainment offered was a floor show which also gave a performance at the Patio later on in the evening.

There was no business meeting or after dinner speak-

ing, just a plain good time outing, with no business attached except for the officers of the association.

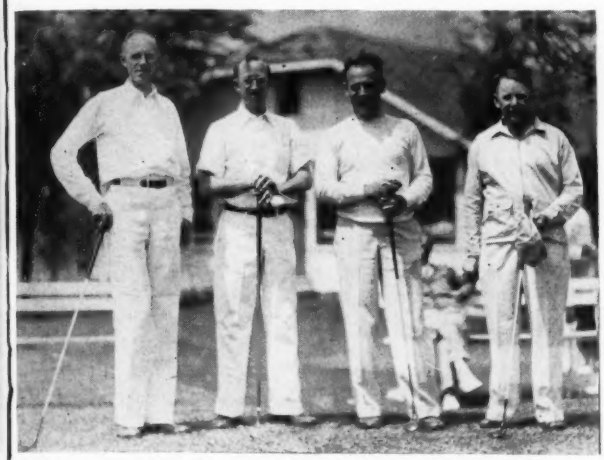
We decided to have the Fall meeting at the Charlotte Hotel on Oct. 8th, 1938.

Respectfully submitted,

J. W. IVEY, *Secretary.*

OUTING, MID-WEST SECTION

THE annual outing of the Mid-West Section was held at Lake Wawasee, Indiana, on June 18, 1938. Luncheon and dinner were served at the South Shore Inn. There were 70 members and guests present.



Left to right—Arthur T. Brainerd, Walter E. Brainerd, Edward J. Siegrist and Herbert W. Tetzlaff.

Arrangements were in charge of Herman Boxser, R. N. Griswold, G. T. Latham, Carl Bick, M. H. Wertheim and Jacob Axelrod, who received a rising vote of thanks for their efforts in making this outing a success.

There were forty-five prizes awarded for golf, and the donors of these prizes were sent a letter of appreciation.

The first and second place winners in each class were as follows:

1st Low Gross—Class A—Elmer F. Smith.
2nd Low Gross—Class A—Arthur T. Brainerd.

Left to right—Mel Shaw, John Noble and Carl E. Bick.

1st Low Gross—Class B—Frank F. Beverly.
2nd Low Gross—Class B—B. C. Blowney.
1st Low Gross—Class C—Clifford Jones.
2nd Low Gross—Class C—Frank Remus.

Respectfully submitted,

HERBERT W. TETZLAFF, *Secretary.*

MEETING, SOUTHEASTERN SECTION

THE Southeastern Section held its regular winter meeting at the Ralston Hotel, Columbus, Ga., on Saturday evening, Jan. 22, 1938. There were 104 members and guests present at the dinner.

The meeting was called to order at 8:15 by the Chairman, Mr. E. A. Feimster, Jr. He explained that due to the fact that this was the annual business meeting for the election of officers, the technical program would consist of only one paper, following the business sessions.

The first report was on the National Meeting at Philadelphia. Mr. S. I. Parker and Mr. R. W. Philip spoke on various aspects of the meeting and emphasized the fact that this Section has a big job on their hands in connection with the next Annual Meeting. Next, the Nominating Committee, consisting of Mr. C. A. Jones, Mr. S. I. Parker, and Mr. M. T. Johnson, reported the following ticket:

Chairman—Robert W. Philip, Editor of "Cotton."
Vice-Chairman—Allen Jones, Supt. Muscogee Mfg. Co.
Secretary—Alfred R. Macormac.
Treasurer—W. Fred Crayton.
Member Nat. Nom. Com.—A. Kempton Haynes.
Councilor—C. A. Jones.
Sectional Executive Com.—Frank L. Asbury, Jr., L. L. Bamberger, Dr. H. L. Barthelmy, Perrin N. Collier, E. A. Feimster, R. A. Field, Jr., Curt Mueller, E. S. Tillinghast.

Upon a motion duly made and seconded this report was accepted. There being no additional nominations from the floor it was regularly moved, seconded and passed that the above officers be elected.

Mr. Feimster called for any new business. Mr. Curt Mueller invited the Section to hold its Spring Meeting in Macon, Ga. The invitation was accepted and the chairman appointed Mr. Curt Mueller, Mr. Frank Asbury and Mr. P. N. Collier as a local committee on arrangements to work with the Section chairman.

Since there was no other business to come before the meeting, Mr. Feimster then introduced the speaker of the evening, Mr. Allen Jones, Superintendent of the Muscogee Mfg. Co., of Columbus, Ga. Mr. Jones spoke on "Processing Dyed Cotton and Yarn in the Mill." Mr. Jones' talk was a forceful exposition of what the mill superintendent has a right to demand of his dyer and an earnest plea for full cooperation between the superintendent and all his overseers. The complete paper was published in the Proceedings.

Respectfully submitted,

A. R. MACORMAC, *Secretary.*

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary or the American Dyestuff Reporter any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE.

Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

A-4

Education—University of South Carolina, New York University, Philadelphia Textile School.

Experience—Chemist for 3 years with dyestuff company; 1 year as chemist in dyeing plant on pure and tin weighted silks and rayon; 3 years plant chemist for cotton dyeing, printing and bleaching plant. Can install Rapidogen system, including construction of necessary equipment.

Married; age 31; references. Will go anywhere.

A-B-1

Education—Graduate chemist and colorist from a leading textile institute. Speaks French fluently. High standing at school. Awarded 1st prize in chemistry. Member of honor society.

Experience—Knowledge of most processes of textile manufacturing and some experience in woolen and worsted piece and stock dyeing and color matching. Knowledge of finishing. Wishes to get into laboratory or dyehouse.

A-B-7

Education—Evening school in textile dyeing and chemistry.

Experience—Dyehouse laboratory for 2 years. Foreman dyer and finisher on hosiery for 9 years. Experience on ribbons also vat dyes on rayon and silk skeins. 2 years assistant to superintendent. Desires position either in demonstrating and sales or dyer. Age 31; married.

A-B-C-4

Education—Educated abroad.

Experience—Twenty years experience in the textile field as bleacher, dyer, finisher and chemist. 16 years in charge of dyestuff laboratory of large dyeing plant, 4 years as chief chemist with large bleachery. Has tested dyestuffs, and chemicals used in the textile field and has manufactured soaps and textile specialties. Has handled all textile fibers; bleaching, printing, dyeing and finishing same. Has done pigment and lacquer printing, waterproofing and fireproofing. Reason for leaving last position was due to business conditions.

Age 41; married.

A-B-C-5

Education—High school textile school graduate (textile school of Barman, Germany).

Experience—8 years skein and ribbon dyer; 2 years chemist-colorist laboratory work in Germany. 10 years boss dyer and superintendent for finishing in leading ribbon mill. German; American citizen; married; 40 years of age and willing to go anywhere.

A-B-C-6

Education—English Municipal School of Technology; Board of Education, So. Kensington Chemistry Certificates; City & Guilds of London Institute in Bleaching and Dyeing.

Experience—In U. S. A. 22 years as chemist and chief chemist with one of the largest textile plants in the country; expert colorist; long experience with permanent and semi-permanent finishes. Specialist on vats, naphthols and indigosols. Age 49; married.

A-B-C-7

Education—B.T.C., Lowell Textile Institute, member of honor society; speaks French fluently.

Experience—3 years as textile research chemist in charge of dye house and advisory to purchasing for large Canadian plant. Experienced in woolen and worsted yarn dyeing, for weaving and knitting; raw stock, top dyeing, piece goods dyeing and finishing. Laboratory practice in planning and checking methods and processes, costing and purchasing. 1 year experience as assistant dyer in top dyeing and print works. 1 year as chief chemist in cotton mill in charge of laboratory and control work of vatcolors, naphthols, sulfur and developed colors.

Married; age 28; references; American citizen; will go anywhere; desires opportunity to prove capacity.

A-B-C-F-1

Education—Textile institute course; extension work at Brown; executive training with Alexander Hamilton Institute; knowledge of German.

Experience—Dyeing executive in all types of textiles, including stock, yarns, and piece-goods. Thorough knowledge of all classes of dyes and dyestuffs, and their successful practical application in the plant. Wide experience in all types and makes of equipment used in dyeing, bleaching, mercerizing and finishing. Laboratory practice in planning and checking methods and processes, costing and purchasing. Good manager personnel for efficiency and satisfactory results economically obtained. Cotton, rayon and silk, some acetate rayon, and mixed fabrics. Age 46; excellent references; in excellent health.

A-B-C-F-2

Education—Lowell Textile Institute, 1911.

Experience—26 years in cotton yarn and piece goods finishing plants; expert on naphthols, vats and other cotton and rayon dyeing; all types of control work and testing; analytical processes; purchasing of dyes and chemicals. Age 46; excellent references; in perfect health; will go anywhere; married.

A-B-F-1

Education—Technical School. Dyeing and Chemistry.

Experience—Mill chemist. Dyer: yarns, tops and rawstock; wool, cotton and rayon. Vigoreaux printing. Bleaching. Would like position as dyer, chemist or demonstrator. Business conditions reason for leaving last position. Excellent references. Age 45.

B-3

Experience—Foreman piece dyer for the past 21 years. Can dye the following: rayon, cotton backs, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

B-4

Experience—Foreman dyer in charge of ribbon dyeing for 20 years. Experienced on silk, cotton, rayon, acetate yarn. Age 41; will go anywhere.

B-5

Education—High School and Textile School Graduate.

Experience—Twelve years overseer of dyeing on directs, vats, naphthols, sulfur, basic and developed colors. Also experienced bleacher. Age 40; married; references.

B-6

Education—Textile School Graduate.

Experience—Former instructor in chemistry and dyeing. Twelve years' experience as overseer of dyeing of vats, naphthols, developed, indigosols, sulfur and direct colors on piece goods. Age 35; excellent references.

B-C-1

Experience—20 years experience in dyeing and finishing departments; 15 months as general superintendent of well known woolen mill. Capable of handling dyeing alone or in combination as superintendent of dyeing and finishing.

Age 40; references.

B-C-2

Experience—12 years foreman piece dyer on vats (pigment), naphthols, soluble vats, sulfurs, developed, basics and directs. Pads, jigs, boxes and continuous machines. All constructions of cottons and rayons. Full practical knowledge of bleaching, mercerizing, and working knowledge of most finishes and finishing machinery. Could take charge of entire wet processing.

Age 38; married; references.

B-D-1

Education—Received early training in England and attended technical college there.

Experience—Dyeing executive; all types of ladies and men's hosiery and all types of textiles including stock, yarns, piece goods and government uniforms; woolen and worsted suitings; cotton, silk and rayon on yarns, piece goods and mixed fabrics; thorough knowledge of all types of dyes, successful application of same and laboratory work. Fourteen years with one employer; business conditions reason for unemployment.

Age 52; married; English American; sober and reliable. Desires position as dyer or demonstrator and service man for dye company.

AMERICAN
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NAMES FOR NEW FIBERS

LANITAL means Italian wool. Why start calling a new fiber wool when it is not wool, after the experience of calling cellulose fibers artificial silk when they had only a superficial resemblance to silk, and after the trouble we had in getting rid of that misnomer?

The comparatively new German name Zellwolle is no better. It is like such loose terms as cotton wool which apparently means soft unspun cotton, without really meaning much of anything. Such designations should certainly not be used by technical men in the textile industry.

We now have, after years of effort, the term rayon, legally accepted and defined for all artificial fibers derived from cellulose. At least we suppose that any new fiber derived from cellulose, whether a new ester, ether or what not, will be known as one of the rayons.

Now, how about the non-cellulose artificial fibers, and the combinations of cellulose and non-cellulose material in the same filament? Have you thought about a name for all of these when they are to be discussed collectively? Should the term rayon be extended to cover all of them? Instead of casein wool, how about casein rayon, fish albumen rayon and so on through soy bean protein rayon, muscle fiber rayon and we know not how many others?

Somehow, rayon does not seem to be the right name for all these protein fibers which, in general, have properties much more like wool than like cellulose rayons. They are so completely different chemically that a new generic name seems called for.

But, before we jump into the gap to fill this obvious need, we must not overlook the numerous efforts to dissolve (or, more properly, disperse) and re-spin real wool and real silk fibers from used material or virgin waste, to make new fibers or filaments. Will these be artificial wool and silk? They will not be synthetic wool and slik although in a more general sense they will be synthetic fibers. Whoever develops them will want a name which connotes all the virtues of natural wool and silk because he will say "They *are* wool" or "silk," as the case may be. What then will be a proper designation for these fibers, probably in addition to the maker's name?

Now to add to the confusion we are getting an entirely new kind of "union" goods, not made by combining two or more kinds of yarn, nor two kinds of fibers, but by uniting two very different chemical substances in the same fibers. We do not know much about the state of this part of the art but it may easily "go places." Aside from various experiments mentioned in the literature, such as mixing fish albumin and viscose, there are already combined commercial fibers.

We have recently heard of Cisalfa, an Italian fiber of 25 per cent casein and 75 per cent cellulose which can be dyed with wool colors. Another, with a fancy name, Lacisana (Zellwolle), is described as containing 3 per cent casein, of dull finish, and suitable for spinning on cotton or wool systems. These will serve to illustrate the point and they might still be called rayons, but would that term be acceptable, and should it be used in any present or future cases where such fibers consist of less than 50 per cent cellulose and more than 50 per cent of other material?

And just to complicate the matter a little more, there are already patents and limited amounts of fibers which have no relation to natural fibers or to any of the foregoing materials. They have been made, in some cases at least, from simple chemical materials by polymerization or processes related to the formation of resins. With the remarkable advances in such lines within the last few years there is no telling how far such fibers will go. We have already seen some rather astonishing results. Is there any possibiliiy of forestalling confusion in this field by deciding upon one or more general names ahead of time?

Probably, if you have read as far as this you will agree "There ought to be a law" etc. There cannot very well be a law but there can be some thought on the subject, and the appreciation that we will have a more convenient and intelligible literature as well as a better understanding of the fibers and greater convenience in working with them if there are class designations which give an idea of the general nature of the fiber in addition to any trade name that it may carry.

A large group could be known by some simple name such as Protex to show that they are man-made protein textile fibers. Perhaps Procel would do for protein-cellulose combinations, and Polytex for polymerized textile products, and so on. Then we would have Lanital

Protex, Cisalfa Procel, etc. The real use comes when we want to make a general statement, for example, that we shall eventually (perhaps) have Protex fibers made from animal proteins and vegetable globulins not heretofore used for such purposes as well as from regenerated silk and wool. This, of course, indicates the possibility of many Procel combinations some of which will no doubt prove to be of great value. Since decomposition is involved in working-up the natural raw materials for the Procel and Protex as well as the rayon types, they may never reach the heights of durability and strength that may eventually be obtained with Polytex fibers where the whole process is one of synthesis rather than partial destruction and reconstruction.

With these more or less philosophical remarks to illustrate the use of such terms (not necessarily the ones employed above) we come to one or two practical points on selecting or devising names. They should preferably be short, and some may desire that they be etymologically correct, pure Anglo-Saxon, Latin or what-not, with no hybrids between Greek and Chinese or other incompatible combinations.

In naming rayon there was apparently an effort to obtain a "catchy" name which would help catch the consumer's dollar because rayon was trying to make its way in the world. The name sounds good but it does not mean much of anything as far as textiles are concerned except that its French meanings of ray and beam or gleam imply the brightness which we have been trying so hard to subdue.

Of course it is not necessary but it would seem sensible to classify and name the prospective types of fibers on some basis having a relationship to chemistry or textiles so that the names would have some real meaning. This can be done before the commercial interests involved become too important. The manufacturer can have his trade name as a trade mark. A system will also be to his interest because it will prevent an individual's trade name or mark becoming adopted as the general name for the material.

The best known example is Cellophane. This name was a perfectly good trade mark for Cellophane cellulose film, but standing alone it became the name of that material and has, we understand, lost its value as a trade mark. If Lanital, or some better American name for casein fiber, is coupled with Protex (or some better name) it can stand for one manufacturer's product as long as it is a trade mark and it will not become the general name of the material, usable by any one else.

It may not seem important now but perhaps we have hinted at enough reasons to start some interest, perhaps even a committee to consider a systematic nomenclature of present and prospective man-made fibers so that the general class can be indicated in some simple way which will also be readily adaptable to the addition of the manufacturer's trade name.—*Contributed Editorial.*

Textile Testing—

(Continued from page 412)

any sample present, the results are then used to correct a direct determination for impurities present in the reagents or to furnish necessary data for an indirect determination. Unless otherwise indicated, temperatures are given in degrees Centigrade; weights in grams; and volumes in cubic centimeters (or milliliters).

In addition to the usual classification of tests as qualitative or quantitative, we may further classify chemical textile tests into three main groups as follows:

1. Extraneous matter present—inorganic and organic.
2. Fibers present.
3. Condition or state of the fibrous material.

In general, standard methods have not been adopted for chemical testing and it is necessary to choose between several methods, all in more or less general use.

Chapter 10—Inorganic Extraneous Matter

Ash

The object of this test is to determine the amount and often the qualitative composition of all of the mineral matter present in a textile sample. Two procedures may be used according to whether a burner or a muffle furnace is used. A sample is dried and weighed and then placed in a tared porcelain or silica crucible. If a burner is used, the sample is ignited gently until the sample is all carbonized (no more fumes coming off) and is then ignited strongly until all carbon is burned off. The crucible and contents are cooled in a desiccator and weighed. When two weighings with a half hour's ignition between are substantially identical, the ashing is complete. If a muffle furnace is available, the crucible, and sample) is placed in front of the open muffle until the carbonization is carried out and the ignition is completed inside the muffle at a temperature of about 800° C. If we let a=weight of dry sample

b=weight of empty crucible

c=weight of crucible and ash

$$\text{Then } \%\ \text{ash} = \frac{c-b}{a} \times 100$$

The above determination may be in error because:

1. Carbon dioxide may be lost from carbonates.
2. Water may be lost from inorganic matter containing water of crystallization or from hydroxides.
3. Ammonium salts are volatilized and lost.
4. A few inorganic materials sublime, these are comparatively few and unlikely to be present in textiles.

The mineral matter present in textiles may be derived from one or more of the following sources:

1. The natural ash of the fiber.
2. Mineral matter applied in connection with dyeing.
   a. Mordants.
   b. Part of the dye molecule.
   c. Aftertreatments of the dye.
3. Weighting materials.
4. Proofing treatments.

TABLE XII
Natural Ash Content of Fibers

Fiber	*Usual range Per Cent*	*Average Per Cent*	*Maximum Per Cent*
Cotton, raw, mechanically clean	0.9-1.2	1.0	1.3
Cotton, scoured	0.2-0.3	0.25	..
Cotton, bleached	..	..	0.1
Ramie, raw	2-6	..	6.0
Ramie, purified	..	1.75	..
Flax	1-6	..	6.0
Jute	0.9-2.0	..	..
Rayons, not delustered	0.1-0.5	0.2	..
Silk, raw	..	1.0*	..
Silk, boiled-off	..	0.5	..
Tussah, raw	..	..	5.0
Tussah, purified	..	0.25	..
Wool, scoured	..	1.0	..
Wool, fine and medium	..	..	1.0
Wool, coarse	..	..	3.0

*A poor average, large amount of variation.

present at all are usually in fairly large quantity. Tannin mordant is usually fixed with tartar emetic which would leave a small residue of antimony oxide. The acid and direct cotton dyes are mostly the sodium and calcium salts of color acids and these elements may be found in rather small amounts in the ash. Occasionally, dyes are encountered which contain zinc, chromium, or copper as part of the dye molecule. Cotton dyeings are sometimes aftertreated with copper sulfate or sodium or potassium dichromate to improve the fastness; these substances would be left in very small quantities if at all. Wool may be dyed by an after-chrome process which would leave an ash of chromium oxide or of chromate.

Weighting, if present, will usually be present in large amounts. Wool is seldom if ever weighted. Light cottons may be weighted with calcium sulfate, magnesium sulfate, or more likely with China clay or talc (magnesium aluminum silicates). Silk goods are quite frequently weighted with iron tannate, or Prussian Blue (ferric ferrocyanide) in dark colors. Light colored silks are usually weighted with tin or aluminum combined with silicate and/or phosphate. There is some weighting of silk done

Qualitative Analysis of Ash

Fiber	*Constituents present in large amounts*	*Constituents present in small amounts*
Cotton, raw, mechanically clean	K, Ca, CO_3	Na, Mg, Fe + Al, SO_4, PO_4
Cotton, scoured	K, Na, SO_4	Ca, Mg, Fe + Al, PO_4, Cl
Silk, boiled-off	K, Na, Ca, CO_3	
Wool, scoured	K, Ca, Fe + Al, SO_4	Na, SiO_3, CO_3

a. Waterproofing.
b. Fireproofing.
c. Mothproofing.
d. Mildew-proofing.

5. Delustering.
6. Accidental spots or stains.

The natural ash content of textile fibers is given in Table XII. It will be observed that the raw fibers vary considerably but that scouring or bleaching not only decreases the amount of ash but also makes it more nearly constant from one sample to another. It is usually possible to decide from an ash determination and Table XII whether there is present any additional mineral matter. Thus a sample of scoured and dyed cotton with an ash content of 0.65 per cent will almost certainly contain mineral matter in addition to its natural ash content of 0.25 per cent (average). If additional mineral matter be found present, the ash should be analyzed qualitatively for the constituents; the last part of Table XII gives the qualitative analysis of cotton, wool, and silk so that allowance may be made for these constituents in considering the results of the qualitative tests on the ash. The source of these additional mineral constituents will be considered in the following paragraphs.

The customary mordants consist of the hydroxides of antimony, iron, copper, aluminum, chromium, and tin; these will be found in the ash in the form of oxides and if with zinc or lead salts and some which use tungstates of various metals.

Waterproofing may be carried out using aluminum acetate or sometimes aluminum or copper soaps; other methods use organic compounds which would leave no trace in the ash. Fireproofing may be carried out with ammonium salts (volatile) or by means of alum, sodium silicate, borax, sodium phosphate, or sodium stannate. Mothproofing is usually done by means of chincona alkaloids (organic) or by means of various fluorides of sodium, calcium, and aluminum. Mildew-proofing may be by means of various organic substances which leave no ash or by zinc chloride, copper soaps, or copper-cutch mixture.

Delustering of rayon is generally carried out by means of titanium dioxide, or barium sulfate. Very seldom are metallic soaps or zinc compounds found nowadays.

Accidental stains or spots may, of course, be of any origin. Usually these spots are quite small so that an ordinary analysis cannot be carried out. In these cases, microchemical tests are valuable; the spectroscope may be used; or tests may be carried out under the microscope to identify the constituents present. Rust stains are perhaps the most common and these may be determined by the common tests for iron.

References:

(1) Trotman, S. R. and Trotman, E. R. Textile Analysis. J. B. Lippincott Co., Philadelphia, 1932.

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Ash Alkalinity

This may be determined separately or the ash from the previous test may be used for this test also. The test is as follows: Dry a 5-gram sample at 110° C. and weigh. Place in an ignited silica (or Sillimanite) dish and ash. Treat the ash with 10cc. of N/100 sulfuric acid (pipetted in), cover with a watch glass and warm for one hour on the steam bath. Wash the contents into a 125cc. conical flask, add 60cc. of distilled water and one drop of 0.2 per cent solution of Methyl Red indicator. Titrate with N/100 sodium hydroxide, using one drop of Methyl Red indicator in 70cc. of distilled water for a comparison end point. Run a blank on 10cc of the N/100 acid. Calculate the results to milli-equivalents of alkali per 100 grams of dry sample. If we let

a = weight of dry sample
b = volume of alkali used for blank
c = volume of alkali used in test
n = normality of the standard alkali

Then

$$\text{Ash alkalinity} = \frac{(b\text{-}c)n}{a} \times 100$$

The advantage of ash alkalinity over the ash determination is that it is more accurate to titrate than to attempt to weigh a few milligrams of ash. As we shall see later, ash alkalinity may also be used to detect damage in cellulose, and is also connected with the ability of cellulose to absorb Methylene Blue.

As an example of what may be expected for values of the ash alkalinity, a series of tests on raw cottons with ash contents of 1.07-1.58 per cent gave ash alkalinities of 14.5-21.5. The same cottons after a thorough water wash gave ash contents of 0.15-0.26 per cent and ash alkalinities of 4.1-6.0.

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Silk Weighting

The determination of the amount of weighting present on silk has always been of great commercial importance because of the high value of the fiber weighted. The weighting material may be iron as Prussian Blue or as iron tannate; tin as silicate, phosphate, tungstate, or hydroxide; occasionally zinc or lead compounds are used for weighting; sometimes logwood is applied in such large quantities as to be considered as weighting. In addition to these weighting materials sugar, glucose, glycerine, gelatine, tannin, and sulfates of sodium or magnesium may have been used on the silk as finishing compounds.

A qualitative analysis of the silk may be made if the processes to which it has been exposed are unknown. The identification of the finishing materials will be taken up in a later chapter; the identification of the weighting may be done by ashing a sample of the silk and testing the ash for the above-mentioned metals and acid radicals, making allowance for the decomposition of the Prussian Blue (ferric ferrocyanide) and iron tannate to ferric oxide during the ignition. Tin phosphate or tin silicate weighting is by far the most exensively used at present.

Four important methods have been suggested for the quantitative determination of weighting:

1. Determination of nitrogen by the Kjeldahl method and calculation of the fibroin present. This requires a preliminary removal of all dyes and any Prussian Blue present; this is generally impracticable.

2. Determination of the ash. This is the quickest method if tin weighting is present; there is some loss of water of hydration from the tin compound which makes it somewhat inaccurate, however. It has been suggested that a correction factor of 1.12 be applied to the ash to give the tin weighting present.

3. Alternate treatments with sodium carbonate and acid, the acid being hydrofluoric acid if silicate is present or hydrochloric acid if silicate is not present. This was a standard method at one time but has been found to be inefficient in the removal of weighting so that different analysts had difficulty in checking each other.

4. Treatment with a mixture of hydrochloric and hydrofluoric acids. This method has been found to be more efficient than the use of either acid singly and to give more reproducible results. The standard method of the A.A.T.C.C., which does not differ materially from the original method of Mease will therefore be given in detail.

a. Solutions used:

Acid reagent: 2 per cent by weight of hydrofluoric acid and 2 per cent by weight of hydrochloric acid in distilled water.

Sodium carbonate reagents: 2 per cent by weight of anhydrous sodium carbonate in distilled water.

b. Take a sample of the silk of 3 to 5 grams and preferably across the whole width of the cloth, dry at 105-110° C. for 1½ hours, place in a tared weighing bottle, cool in a desiccator, and weigh. Let the weight of this sample = A.

c. Digest in 90-100 times its weight of distilled water at 65± 1° C. for 20 minutes. Squeeze out the sample, place in 40-50 times its weight of distilled water and heat to 65° C. Repeat this rinsing twice more, squeeze, rinse with two 30 cc. portions of warm alcohol, rinse with two portions of ethyl ether at room temperature, squeeze, air-dry. Drop the sample into a beaker of boiling water, let it stand for 5 minutes, squeeze, dry, and weigh as before. Let this weight = B.

d. Place the sample in 90-100 times its weight of acid reagent, heat to 55± 1° C., and hold at this temperature for 20 minutes. Pour off the acid reagent, treat with 200 cc. of distilled water at 55° C. for 5 minutes, repeat the water treatment, remove the sample and squeeze.

e. Repeat treatment (d).

f. Repeat treatment (d) but use sodium carbonate reagent in place of the acid reagent.

g. Repeat treatment (d) twice more, using acid reagent.

h. Squeeze, rinse with alcohol, then with ether, then with boiling water, dry, and weigh. Let this weight = C.

i. Ash the residue and determine the weight of the ash. Let this weight = D. (This treatment should give a negligible ash and step (i) is performed merely as a check on the previous treatments, it may be omitted in routine work.)

j. Calculations:

$$\% \text{ finishing materials} = \frac{A-B}{A} \times 100$$

$$\% \text{ total weighting} = \frac{A-C+D}{A} \times 100$$

References:

(1) Matthews, J. M. Textile Fibers, John Wiley and Sons, Inc., New York, 1924.

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Acids and Alkalies

The problem of the determination of acid or alkali in textile goods is complicated by the fact that small quantities of acid or base are adsorbed by the fiber and held rather tenaciously. We cannot simply extract the goods with water and test the extract, even for qualitative results, nor can we suspend the goods in water and titrate with the proper reagent because the reagent would then be adsorbed by the fiber. For qualitative tests, we must apply the indicator directly to the fiber and for quantitative results we must neutralize the adsorbed acid or base with a base or acid which is not itself appreciably adsorbed and titrate the excess of the reagent.

In the case of cotton goods, the difficulty is not so great because adsorption is much less in quantity and the acid or base is less firmly held. Litmus paper pressed between layers of moistened cotton goods for a few minutes or moist litmus paper pressed on the fabric will give a slight color change with .01 per cent acid or alkali. A more sensitive test is to use a saturated solution of Methyl Red in water as an indicator, when spotted directly onto the fiber this turns red with .005 per cent acid and yellow with .005 per cent alkali. Kolsky and Jones have shown that small amounts of acid or alkali may be detected by a heating test; this will be given in more detail later.

There is no satisfactory qualitative test for acids in wool which will work on traces of acid but Clayton's Methyl Green test is available for traces of alkali. A 0.25 gram sample of the wool is boiled in 200 cc. of water containing 1 cc. of a 0.1 per cent solution of Methyl Green (Colour Index No. 684) in a white silica dish. If alkali is present to the extent of .04 per cent in the wool, complete decolorizing of the dye will result.

In the quantitative determination, regain is determined on a separate sample, as described in Chapter 9, while the chemical test is being carried out on the other samples. The N/50 sodium hydroxide method which is accurate to .02 per cent acid or alkali is satisfactory on cotton goods: Boil 100 cc. of distilled water in a conical flask, add 1 cc. of 0.5 per cent phenolphthalein and add N/50 sodium hydroxide until a very faint pink color is discharged, titrate with N/50 sodium hydroxide until the same pink color is obtained again. The blank on a perfectly neutral cotton fabric is equal to 0.10 cc. of N/50 sodium hydroxide. If the addition of the sample causes a deepening of the color instead of discharging it, add an excess of N/50 sulfuric acid to discharge the color and then titrate with N/50 sodium hydroxide as before. A sample set of data and calculations is given below:

Determination of Sulfuric Acid in Cotton

a. Weight of bottle and sample		44.3450 gms.
b. Weight of bottle + dry sample		44.2535
c. Weight of bottle alone		40.7546
d. Weight of moisture (a-b)		0.0915
e. Weight of dry sample (b-c)		3.4989
f. % regain (100d/e)		2.62%
g. Weight of sample for test	3.2429 gm.	3.1077 gm.
h. Dry weight of sample $\left(\frac{g}{1+f/100}\right)$	3.1692	3.0284
i. Volume of NaOH	2.10 cc.	1.60 cc.
j. Blank on neutral fabric	0.10	0.10
k. Corrected volume of NaOH (i-j)	2.00	1.50
m. Normality of NaOH	.0197	.0197
n. Milliequivalent weight of sulfuric acid	.049	.049
o. % sulfuric acid 100 k×m×n/h	.062%	.064%
p. % sulfuric acid (average)		0.063%

In the determination of acid in wool, several methods are available all of which may be classified under one of four general methods:

1. Neutralize the acid with a weak base which is itself not adsorbed, titrate the excess of the base.

a. Ammonia method.
b. Sodium bicarbonate method.
c. Triethanolamine method.

2. Treat with a soluble salt which will liberate an insoluble acid, remove the acid, titrate the excess of the salt.
a. Sodium terephthalate method.

3. Treat with a soluble salt which will liberate a volatile acid, distill over the acid and titrate it.
a. Sodium acetate method.

4. Extract the acid with a base and titrate it directly in the base with phenolphthalein indicator.
a. Pyridine method.

The ammonia and sodium bicarbonate methods are less satisfactory than the triethanolamine method; the sodium terephthalate method has not proved satisfactory in the author's experience. The sodium acetate method is slow and tedious but gives satisfactory results and is especially valuable when the wool is dyed with a color which bleeds easily; the triethanolamine method and the pyridine method are recommended for most cases.

The triethanolamine method and a sample calculation are as follows: Soak 2.5 gram samples overnight in 50 cc. of N/10 triethanolamine and 50 cc. of water. Filter, wash with four washings of 75 cc. each of hot water. Titrate the combined filtrate and washings with standard N/10 acid, using Methyl Red indicator. Run a blank on 50 cc. of triethanolamine and the same amount of water as was used for washing above.

Determination of Sulfuric Acid in Wool

a. Weight of bottle and sample		51.1408 gms.
b. Weight of bottle and dry sample		50.9646
c. Weight of bottle alone		48.6136
d. Weight of moisture (a-b)		0.1762
e. Weight of dry sample (b-c)		2.3510
f. % regain (100d/e)		7.47%
g. Weight of sample for test	2.7680 gm.	2.5330 gm.
h. Dry weight of sample $\left(\frac{g}{1+f/100}\right)$	2.576	2.357
i. Volume of acid for blank	59.67 cc.	59.67 cc.
j. Volume of acid for sample	55.58	56.04
k. Volume of acid corresponding to acid present in the wool (i-j)	4.09	3.63
m. Normality of acid used	.0926	.0926
n. Milliequivalent weight of sulfuric acid	.049	.049
o. % sulfuric acid (100k×m×n/h)	.72%	.70%
p. % sulfuric acid (average)		0.71%

The sodium acetate method is carried out as follows: Place 2 gram sample of wool and .5 to 1.0 grams of sodium acetate in a 500 cc. distilling flask with water and steam distill until 50 cc. have distilled over. Titrate the distillate with N/10 sodium hydroxide, using phenolphthalein as an indicator. This method is useful on dyed fiber where the dye is apt to bleed.

The pyridine method of Barritt as modified by Eavenson and Creely is as follows: A 5 gram sample of wool is placed in a 500 cc. flask and 300 cc. of 0.5 per cent pyridine solution as near the boiling point as possible is added. Shake for 5 minutes, take off an aliquot of 150 cc. and titrate with N/20 sodium hydroxide, using phenolphthalein as an indicator. If the sample is dyed and the color bleeds, use pyridine at room temperature and allow it to stand for an hour.

If the alkali in wool is to be determined, it is found that soaps are included with the alkali. Two general methods are available:

1. Treat with an insoluble acid which combines with the alkali to form a soluble salt, filter, and titrate the salt.
a. Terephthalic acid method.
b. Boric acid method.

2. Add a known amount of acid to the sample, then determine the excess acid by one of the methods previously given.

The boric acid method is as follows: Soak a sample of the wool in 1 per cent boric acid for several hours, filter, wash eight or ten times, titrate the combined filtrate and washings with N/10 hydrochloric acid using Methyl Red or Methyl Orange indicator. If dyes are present, use boric acid saturated with sodium chloride to reduce the bleeding of the dye.

The triethanolamine or pyridine methods may be applied to the determination of alkalies in wool by first adding a known amount of acid to the sample and then treating as in the determination of acid present. The difference between the acid added and the acid found will be equivalent to the alkali present.

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(4) Hirst, H. R. and King, A. T. New Method for the Estimation of Alkali with Special Application to Wool. Journal of the Textile Institute *17*, T94 (1926).

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(8) Stocker, D. E. Determination of Alkali in Wool. Journal of the Society of Dyers and Colourists *53*, 348 (1937).

(9) Kolsky, S. I. and Jones, B. M. Determination of pH of Cotton Cloth and Study of Its Relation to Tensile Strength. American Dyestuff Reporter *20*, 133 (1931).

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(To be continued)

TRADE NOTES • NEW PRODUCTS

OBITUARY

JOHN G. MASSON

JOHN G. MASSON, Superintendent at the Rosemont Mill of Guerin Mills, Woonsocket, R. I., died on July 4th. The funeral was held from Our Lady of Victory church on July 7th.

Mr. Masson was a charter member of the American Association of Textile Chemists and Colorists and was chairman of the Rhode Island Section from June 1934, to June 1937.

• CALCO ADDS THREE

The Calco Chemical Company, Inc. of Bound Brook N. J., announces that Mr. John H. Grady, formerly Manager of the Boston Office of John Campbell and Company has become associated with their Boston Office.

Mr. George Lommel, formerly Vice-President of John Campbell and Company, New York, is now associated with the main office in Bound Brook.

Mr. Robert P. Wood, formerly in the finishing business, is now connected with the Calco Office in Providence.

• DYES AND RUGS

How Du Pont Dyes have materially aided in converting old rugs and carpets into modern rugs is seen in a display of Olson reversible rugs at the Du Pont Exhibit on the Boardwalk at Atlantic City. The display shows the wide variety of colors obtainable in these rewoven rugs which are exhibited in plain and patterned effects and in a range of sizes. Photographs demonstrate the successive steps of renovation from the time the worn and faded rugs are received at the factory until they are rewoven and re-dyed into new-looking rugs.

• SYNTHETIC ORGANIC CHEMICALS

Carbide and Carbon Chemicals Corporation announces the ninth edition of *Synthetic Organic Chemicals*. This 80-page book contains specifications, properties, and uses of its 105 industrial organic chemicals. The properties of 29 new chemicals which have become commercially available since the last issue of this catalog are included, as well as a complete new section on "Tergitol" penetrants. The solubility table has been augmented to include data on 71 solvents, and a new column indicating their solvent power for rubber has been inserted. A copy may be secured by writing to Carbide and Carbon Chemicals Corporation, Dept. M, 30 East 42nd Street, New York, N. Y.

• AAP RELEASE

Another instructive, attractive color card book has recently been released to dyers by American Aniline Products, Inc. It is called "The Dyeing of Wool with Amacid Colors."

Its index states that it contains methods for dissolving dyestuffs, dyeing methods, a list of Amacid colors suitable for wool and silk in a neutral bath, a tabulation of fastnesses of Amacid colors under different conditions and a separate description of each dye that gives its uses and dyeing characteristics.

Printing and die cutting give each swatch the appearance of a miniature bolt of cloth. To keep these swatches neatly in place through many handlings a durable paper backing is used. On each swatch page there are two percentages shown of each of six colors with 102 colors shown in all.

• NOPCO OFFICERS

Charles P. Gulick, founder and former president of National Oil Products Company, Harrison, New Jersey, chemical manufacturers, recently announced that at the June meeting of the Board of Directors he was elected to the newly created office of Chairman of the Board.

John H. Barton, previously vice-president, was elected president, and Thomas A. Printon, former general sales manager of the Industrial Division, was elected Vice-President in charge of Industrial sales.

Other officers of the company are: Perc S. Brown, vice-president; G. Daniel Davis, vice-president; Ralph Wechsler, treasurer; Albert A. Vetter, secretary.

Mr. Gulick stated that the company had recently expanded its plant facilities at Harrison, Chicago, and Cedartown, Ga., and is preparing for a substantial increase in its general business, which consists of various types of chemical products, such as processing materials used in basic industries, as well as a line of essential vitamin concentrates and allied products for the feed, food and pharmaceutical industries.

• NEW SOLVAY OFFICES

Effective on July 18th, the Solvay Sales Corporation occupied new offices at 3615 Olive Street, St. Louis, Mo. This is one of St. Louis' most modern air-conditioned office buildings.

• GENERAL RELEASES

General Dyestuff Corp., 435 Hudson Street, New York, N. Y., announces release of circulars describing the following products:—

Celliton Discharge Scarlet RNL—which produces on acetate rayon fabrics bright scarlet shades which, it is said, can be easily discharged to a pure white with Decroline Soluble Conc. Circular I.G. 1506.

Indanthren Scarlet GK Pdr. Fine for Dyeing—a new homogeneous vat dyestuff which will be of considerable interest for the production of pink to scarlet shades on cotton yarn, rayon and also on piece-goods. It is said to have excellent fastness to light and weather, and therefore, in full dyeings, it is recommended by the manufacturers for awnings. It is stated that it can be satisfactorily applied to piece-goods according to the pigment padding method. It belongs to that class of dyestuffs which are best dyed cold, but for shading purposes, can also be used according to the IW process. Circular I.G. 1499.

Pyramine Orange RF—a direct color which is said to possess very good fast-

ness to storing, acid and scroop. It is stated that it will color cotton and rayon evenly and is also recommended by the manufacturers for dyeing silk. The shades are easily dischargeable. Circular I. G. 1473.

Akaustan N—a new fireproofing compound. Materials treated with it are said to retain their natural handle. Usually a concentration of ¾ to 1½ lbs. of Akaustan N per gallon of water is sufficient. The treatment is best carried out in a cold or lukewarm bath and dried below 120° F. Circular I. G. 1451.

Igepal L—a new synthetic scouring and processing agent containing a solvent. It is similar to Igepal C and W brands but contains very effective organic solvents essential for some purposes and thereby makes possible special effects. It is said to be characterized by very good solubility in water, very good wetting-out property and excellent protective action against the precipitation of lime-soap in hard water; extreme stability towards all chemicals in textile processing; excellent scouring and cleansing action on all kinds of fibers, especially material containing oily or resinified impurities; neutral reaction so that the cleansing causes the least possible stain. Circulars 1457 and 1458.

Hydron Printing Blue 3R Suprafix Pdr.—a highly dispersed vat powder of particular interest for producing smooth prints on pigmented rayon, of a reddish navy. Circular I. G. 1497.

Fast Dark Blue Salt R—which on Naphtol AS ground produces midnight navy blues said to possess very good light and wash fastness. Circular I. G. 1490.

Anthralan Brown 4G—a new straight acid brown brought out by the I. G. and offered to the trade by General. It is said to dye very level and to produce bright brown shades of excellent fastness to light. It is said to meet, in general fastness properties, the requirements for ladies' dress goods and to have very good fastness to ironing. It is stated that effect threads of cotton and rayon are left unstained and acetate rayon is slightly tinted. It is especially recommended by the manufacturers for dyeing of carpet yarns; it is further said to have good affinity for silk and, on account of its good affinity from a neutral bath is recommended for union dyeing. Circular I. G. 1495.

• CIBA REVIEW

Number 10 of the *Ciba Review*, featuring trade routes and dye markets in the middle ages, has recently been distributed. Articles appearing in the issue are described by the following titles: Trade Routes of the Middle Ages; Medieval Dye Markets in Europe; Oriental Dye Markets of the Middle Ages; Medieval Dyeing Technique; Historical Gleanings. There is also included a supplement entitled "Dyed Shades Fast to Sea Water" which, in addition to a general discussion, recommends the use of certain dyestuffs to secure satisfactory results.

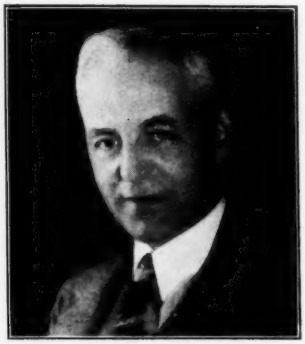
• GEIGY RELEASE

Geigy Company, Inc., 89 Barclay St., New York City, announces the release of a circular describing the following product:—

Setacyl Direct Pink B Conc.—a further addition to the Geigy range of discharge colors for acetate rayon. It gives a bluish pink of a very bright and clear tone, and in this respect it is said to form the most attractive dischargeable red in this series. It is stated that it is very suitable for direct printing on either lustrous or delustered acetate rayon. Circular No. 967.

• JOINS CARBIC

Carl A. Puller, well-known dyestuff salesman, has recently joined the sales staff of the Carbic Color & Chemical Co.



Mr. Puller brings to the Carbic organization a broad experience as well as a personal sales contact gained by years of selling to dyestuff consumers, particularly those located in northern New Jersey.

• DU PONT RELEASE

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., announces release of the following new products:—

"Leucosol" Black RA Double Paste—a new vat dye. A bluish black printing color, suitable for direct or color discharge printing, it was developed for use in instances where other colors have given trouble by marking off on white grounds or viscose process rayon fabrics. It is claimed that it has demonstrated fastness to light, washing and chlorine and presents no application difficulties since it does not foam or form crusts in the barrels, and is grit free. The new dye is said to have good tinctorial strength and can be used on cotton, but is of particular interest for use on bright and delustered viscose process rayon, and saponified acetate fibers.

Fast Blue 4 GLN—a new "Pontamine" dye equal in strength, fastness to light, and general application characteristics to "Pontamine" Fast Blue 4 GL. It produces, however, a more desirable shade which is noticeably greener and brighter. It is designed for use on loose cotton yarns and pieces, especially for those fabrics employed where fastness to light is demanded, for such purposes being useful both alone and in combination with other suitable direct colors. It can be dyed or used as a base for white discharges on all types of cotton, viscose process rayon and pure silk materials.

Du Pont Auramine SP Concentrated—a new basic color developed particularly for spirit printing. It is designed for use where the straight basic colors are employed in preference to the "Rotalin" colors for spirit printing, and where fastness to water bleeding is not a factor. The new color is equal in strength and shade to Du Pont Auramine Concentrated, but is much more soluble in alcohol.

"Rotalin" Red B Extra Concentrated—another addition to the current range of du Pont spirit printing colors. It was developed in response to a demand for a bluer shade of red for spirit printing. The new color produces a shade of red similar to that obtained with Du Pont Rhodamine B Extra, and is considerably bluer than "Rotalin" Brilliant Red B and "Rotalin" Red Y. It is similar in properties to the other "Rotalin" colors and may be handled in the same manner in the preparation of spirit printing inks.

• OCTYL ALCOHOL

Recent investigations by Carbide and Carbon Chemicals Corporation have shown that correct concentration is essential for best results in using Octyl Alcohol to prevent foaming in many textile operations. For certain applications it was found that the use of too high a concentration caused foaming instead of preventing it. This condition was quickly corrected when the concentration of Octyl Alcohol was reduced. The optimum anti-foam concentration was obtained when a saturated solution of Octyl Alcohol and water was formed—about 0.14 per cent by weight of Octyl Alcohol at 25° C. It is believed that this rule may hold for other aqueous solutions and that more Octyl Alcohol will be required to prevent foaming of solutions in which it is more soluble than in pure water.

It is claimed that important economies are now being effected in many textile operations in which the problem of foaming has been successfully overcome by the use of Octyl Alcohol. For instance, 3 oz. of Octyl Alcohol stopped 900 gal. of a diazo compound from foaming and made it possible to process nearly twice the quantity per batch without requiring a change in equipment. The tank used to dissolve and process this dye mixture had a capacity of about 1,500 gal. Due to foaming it was not possible previously to process

more than 500 gal. of the product at one time. Three ounces of Octyl Alcohol immediately stopped all foaming and permitted 900 gal. of the mixture to be processed at one time.

Again, in the grinding of dyestuffs to a fine particle size, where water is used as the medium for the grinding operation, one-quarter per cent by weight of Octyl Alcohol not only gives a more uniform grind but also considerably reduces the time required for grinding.

Many textile printers are now using Octyl Alcohol for defoaming their print solutions. In every case, they report that the incorporation of a fraction of a per cent of Octyl Alcohol in their standard pastes has successfully reduced foaming. The composition of the printing paste, however, has a great deal to do with the amount of Octyl Alcohol required, since the presence of other materials such as British gum, starch, gelatin, diethylene glycol, "Cellosolve," (ethylene glycol monoethyl ether), and other products may increase the amount needed. Also, some colors tend to foam more than others. This is especially true of vat blacks and pigment whites. It is claimed that another important advantage in using Octyl Alcohol as an anti-foaming agent in textile printing, is the fact that this compound, called "2-Ethylhexanol," does not coagulate the egg albumin often used as a thickener.

In an air conditioning unit which scrubs out the dust by means of a water spray, it has been found that the addition of 0.01 to 0.05 per cent of a wetting agent such as "Tergitol" penetrant 7 greatly lowers the dust count. However, due to the lowered surface tension excessive foaming results unless Octyl Alcohol is used to the extent of 10 per cent of the weight of wetting agent. In fact, the tendency to foam in almost every aqueous bath, can be reduced and economies can be realized by the use of small amounts of Octyl Alcohol.

• VERTICAL INTEGRATION

Whether two or more successive steps of textile manufacture or distribution can be successfully brought under the control of one management depends not only upon the presence of certain favorable factors but also upon the particular methods or techniques by which such vertical integration is attempted, according to a study based on two years' investigation by the Industrial Research Department of the Wharton School of Finance and Commerce, University of Pennsylvania, publication of which was announced recently by The Textile Foundation.

The study, which was under the direction of Dr. Joseph H. Willits and Dr. Anne Bezanson of the Industrial Research Department of the Wharton School was made possible by a grant from The Textile Foundation. It was undertaken upon recommendation of the United States Institute for Textile Research through its Committee on Economic Research of which Fessenden S. Blanchard is Chairman. It has had the active support of the presidents or managing directors of many textile trade associations and hundreds of textile concerns cooperated by providing the necessary information.

By analyzing specific cases at the major market stages like finished goods, gray goods, and yarn, the report throws light upon basic and far-reaching questions. How have certain mills been able to sell such finished products as men's suits or neckties instead of fabrics? What policies have assisted large surgical supply manufacturers to establish and operate textile mills successfully? Is there general significance in the factors that have permitted certain rayon weavers to sell both gray and finished goods? By what procedure have some rayon producers been able to establish fabric-producing departments? The answers to these and a host of similar questions are given in the report as well as a statement of the general principles underlying vertical integration.

Discussing the advantages and the disadvantages of organizing on a vertical basis, the report states that some companies have integrated under favorable conditions and failed; others have integrated against severe odds and succeeded. In many such cases, the important factor has been the way in which the integration program was undertaken.

The policies and techniques found most effective in overcoming or minimizing the obstacles usually encountered by the vertically organized company are reviewed to considerable length in the report.

Of all the policies found important to the support of successful vertical integration, that of developing means for adjusting quickly to new conditions is stressed in the report as fundamental.

Integration is not treated in the report as a panacea for the ills of the textile industries. Rather it is presented as a form of organization that has been found of value by some concerns and by some industries in minimizing the speculative aspects of textile manufacturing.

Consideration is given in the report to integration not only by direct means but also by indirect methods. A firm can integrate outright through investing in additional facilities, or it can avoid such investments and still bridge a market. It may have work done on commission, or it may undertake a program of brand promotion.

There are numerous textile companies which have attained many of the benefits of forward integration through branding their particular yarn, fabric, or finished consumers' product and promoting that brand directly to consumers. It is brought out in the study, however, that most of these concerns have had to assume many of the responsibilities that accompany direct integration. A branded fabric, for example, no sooner becomes accepted by the public than safeguards must be set up to protect the brand. These protective measures may take the form of licensing cutters and of supervising the selection of retailers who are to sell the fabric in garment form.

This study is the result of the cooperation of many agencies within the textile industries, and was financed in part by The Textile Foundation.

In view of the fact that the subject of vertical integration in textiles, treated fully for the first time in this report, has long been the subject of debate among textile executives, it is expected that these executives should find this report, titled "Vertical Integration in the Textile Industries," a valuable guide in appraising the business organization of their own companies. Included are chapters dealing with the integration of textile operations and garment manufacture, vertical organization for the fabrication of household textiles, combining the manufacture and use of industrial textiles, the weaving and converting of gray goods, integrating yarn and fabric manufacture, and developing vertical organization by brand promotion. The report is being sold for $1.50 and copies may be obtained from the Industrial Research Department at the University of Pennsylvania, Philadelphia, Pennsylvania.

• JULY TEXTILE RESEARCH

The results of a study of the resiliency, density and filling capacity of various plant fibers used as filling materials by upholsterers is one of the features of the July issue of Textile Research, the monthly bulletin of U. S. Institute for Textile Research. Also described by the author, Brittain B. Robinson, agronomist, Bureau of Plant Industry, U. S. Dept. of Agriculture, are the testing methods employed.

"Some Production and Biological Aspects of Cotton Quality," by H. W. Barre of the Bureau of Plant Industry, U. S. D. A., is the second of a series of four papers descriptive of the work and findings of the Federal-State cotton research program that is being conducted by several bureaus of the U. S. Dept. of Agriculture. It will be followed in the August issue by a paper on the use of X-ray methods for measuring cotton strength by Carl M. Conrad and Earl E. Berkley, and in the September issue with Dr. Enoch Karrer's paper on "Cross-sectional and Related Structural Features of Cotton Influencing Quality."

Two reports of the exhaustive Textile Foundation study on Fundamental Properties of Textile Wastes appear in the July issue.

BOOK REVIEW

American Wool Handbook, *by Werner von Bergen and Herbert R. Mauersberger. First Edition. 864 pages. 5½" by 7¾". Illustrated. Index. Maroon cloth cover with silver lettering. Published by American Wool Handbook Co., New York City. Price $3.95 per copy in U. S. A. and Canada, $4.75 in other countries.*

Very few, if any, books exist in America or written by American authors in the field reflecting American technic and the practical art of converting wool into yarns and fabrics.

This book is the first attempt for a long time in America to consolidate existing old and much new information concerning the growing of wool, its marketing, grading and use in the woolen and worsted trade. It is truly a reference book, written in simple and easily understandable English. Both authors are well known and seasoned practical textile men. Mr. von Bergen is chief chemist of the Forstmann Woolen Co. of Passaic, N. J., for many years, and has been teaching wool manufacture at Columbia University. He is a member of the A.A.T.C.C., A.S.T.M., The Textile Institute of England and the Smithsonian Institution. Mr. Mauersberger is a graduate of Lowell Textile Institute of Lowell, Mass., and technical editor of a trade publication, and for the past fourteen years in charge of the Evening Textile Courses at Columbia University. He is a co-author in the first and second editions of the "Rayon Handbook." He also is a member of many trade associations and acts as a textile consultant for several textile concerns. Both men have many years of practical experience in the woolen and worsted trade in this country and abroad.

The preface to the book is written by Arthur Besse, president of the National Association of Wool Manufacturers, who states that "the book will fill a long felt need and will provide the trade with a valuable and authoritative reference book on all phases of wool production and manufacture."

The contents of the book of 864 pages is divided into twenty-three chapters, a dyestuff appendix and a subject index. The book has over 350 illustrations. Much original and entirely new material is in this book that has never been published before. The contents are logically arranged and begin with a history of the wool trade, the economic and statistical side of the business, sheep raising and wool growing. Then it goes on with the physical and chemical properties of wool, specialty hair fibers, reclaimed wool and secondary raw materials. This is followed by the grading and marketing of wool. The various manufacturing operations are taken up in detail such as Frosted Wool Process, scouring, carbonizing, mixing, carding, woolen and worsted ring spinning, weaving and weaves. The wet and dry finishing operations are explained in much detail and the dyeing, bleaching and printing chapter contains much new information. The manufacture of carpets, rugs and plushes is dealt with by W. T. Harrison and G. E. Hopkins of Bigelow-Sanford Carpet Co. The section on felt manufacture is written by R. K. Brooks of Chas. W. House & Sons. A chapter on dry cleaning is furnished by C. C. Hubbard, Director of the Dry Cleaning and Redyeing School. Then comes a chapter on Physical and Chemical Testing, and an excellent, complete glossary of trade terms. The book closes with a chapter on American and foreign literature on wool, a dyestuff appendix and a subject index. As a whole the book acts as a complete, well-illustrated reference book on all phases of wool production and manufacture for the whole American trade as well as the student, economist and consumer.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Finishing plant chemist desires responsible position. Expert on vats, napthols and other cotton and rayon dyeing. All types of control work and testing. 26 years' experience on yarn and piece goods. Write Box No. 993, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED:—Ten years experience in dyestuff laboratory. Experienced with all types of colors and materials. Pratt graduate. Age 29; single. Write Box No. 129, American Dyestuff Reporter, 440 Fourth Ave., New York, New York.

POSITION WANTED: Dyer with 15 years' practical experience desires responsible position. Expert in dyeing of Silk, Acetate Rayon, Rayon and also mixed fibers. Capable to take charge or supervise all dyeings of piece goods; pure dye and weighted. Willing to take position as Boss-Dyer, Supervisor or Demonstrator. Best references; will go anywhere. Write Box No. 132, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

MANUFACTURER'S AGENT: Covering South, especially Piedmont Section, with complete line of dyestuffs, can handle additional account special chemicals or dyeing machinery. Write Box No. 134, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Graduate Chemical Engineer and Textile Chemist desires responsible position. Eight years' experience as Chemist Colorist in Dye, Print, Bleach, Finish Plants, processing Cotton, Rayon, Silk, employing all types of colors. Can install Rapidogen System, including construction of necessary equipment. Best of references. Will go anywhere. Married. Age 31. Write Box No. 136, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.